

# PHASE I/II ARCHAEOLOGICAL RESEARCH PLAN, U.S. ROUTE 13 RELIEF ROUTE, KENT AND NEW CASTLE COUNTIES, DELAWARE

DRLDOT PROJECT 83-110-01

DELDOT ARCHAEOLOGY SERIES NO. 54

PHWA FEDERAL AID PROJECT F-1001(16)

By

Jay F. Custer, David C. Bachman and David J. Grettler

UNIVERSITY OF DELAWARE
Department of Anthropology
Center for Archaeological Research

Submitted To

U.S. DEPARTMENT OF TRANSPORTATION Federal Highway Administration

and

DELAWARE DEPARTMENT OF STATE
Division of Historical and Cultural Affairs
Bureau of Archaeology and Historic Preservation

Prepared For

DELAWARE DEPARTMENT OF TRANSPORTATION
Division of Highways
Location and Environmental Studies Office

John T. Davis Director Division of Highways

1987

### TABLE OF CONTENTS

	Page
Table of Contents	i
List of Figures	ii
List of Tables	ii
Introduction	1.
Previous Archaeological Studies	4
The Role of a Research Plan and Archaeological Resource Management Plan	6
Prehistoric Archaeological Resources	27
Regional Prehistory	27 30
Historic Archaeological Resources	42
Regional History	42 50
References Cited	80
Public Handouts	94
Published Route 13 Cultural Resources Reports	105

### FIGURES

		Page
1.	Project Location Map	2
2.	U.S. Route 13 Study Area	3
3.	Previous Archaeological Studies	5
4.	Composite Map of Cultural Resources	7
5.	Sensitive Area Locations	8
6.	Final Alignment - Route 13 Corridor	9
7.	Location of Prehistoric Sites in Final Alignment	15
8.	Location of Historic Sites in Final Alignment	18
9.	Final Alignment and Potential Bay/Basin Sites	23
10.	Carey Farm Site Location	24
11.	Environmental Zones	25
	·	
	TABLES	
	TABLES	Page
1.		Page
1.	Special Cultural Resource Areas	_
2.	Special Cultural Resource Areas  Prehistoric Sites Within the Direct Impact Zone	8
	Special Cultural Resource Areas	8
2. 3.	Special Cultural Resource Areas  Prehistoric Sites Within the Direct Impact Zone  Historic Resources Route 13 Direct Impact Zone  Sample Paleo-Indian Period Sites Sites from Route 13	8 12 13
2. 3. 4.	Special Cultural Resource Areas  Prehistoric Sites Within the Direct Impact Zone  Historic Resources Route 13 Direct Impact Zone  Sample Paleo-Indian Period Sites Sites from Route 13  Corridor	8 12 13
<ol> <li>3.</li> <li>4.</li> <li>5.</li> </ol>	Special Cultural Resource Areas	8 12 13 31 35
<ol> <li>3.</li> <li>4.</li> <li>6.</li> </ol>	Special Cultural Resource Areas	8 12 13 31 35 37

10.	Data Quality by Site Function for Settlement Pattern and Locational Studies for 1680-1720	53
11.	Data Quality by Site Function for Settlement Pattern and Locational Studies for 1720-1760	54
12.	Data Quality by Site Function for Settlement Pattern and Locational Studies for 1760-1820	54
13.	Data Quality by Site Function for Settlement Pattern and Locational Studies for 1820-1910	55
14.	Data Quality by Site Function for Settlement Pattern and Locational Studies for 1910-Present	55
15.	Data Quality by Site Function for Economic, Community and Transportation Studies for 1630-1680	56
16.	Data Quality by Site Function for Economic, Community and Transportation Studies for 1680-1720	57
17.	Data Quality by Site Function for Economic, Community and Transportation Studies for 1720-1760	58
18.	Data Quality by Site Function for Economic, Community and Transportation Studies for 1760-1820	59
19.	Data Quality by Site Function for Economic, Community and Transportation Studies for 1820-1910	60
20.	Data Quality by Site Function for Economic, Community and Transportation Studies for 1910- Present	61
21.	Data Quality by Site Function for Methodological and Material Culture Studies for 1630-1680	62
22.	Data Quality by Site Function for Methodological and Material Culture Studies for 1680-1720	62
23.	Data Quality by Site Function for Methodological and Material Culture Studies for 1720-1760	63
24.	Data Quality by Site Function for Methodological and Material Culture Studies for 1760-1820	63
25.	Data Quality by Site Function for Methodological and Material Culture Studies for 1820-1910	64
26.	Data Quality by Site Function for Methodological and Material Culture Studies for 1910-Present	64

#### INTRODUCTION

The purpose of this research plan is to outline the research methods to be used in the Phase I/II archaeological survey of the Route 13 Relief Route and to provide a framework within which to consider the cultural significance of archaeological resources affected by the project. This research plan will outline significant archaeological research questions for the Delaware Coastal Plain, for both the prehistoric and historic periods, and will identify those types of archaeological sites that are most likely to provide data germane to those questions. Thus, this framework is designed to be part of the evaluation of the effects of the proposed Route 13 Relief Route on known significiant or potentially significant cultural resources as defined by the National Register of Historic Places (36 CFR 60) and provided for under section 106 of the National Historic Preservation Act.

The U.S. Route 13 Relief Route project is a study of alternatives to relieve the present and projected traffic conditions on U.S. Route 13 in central Delaware. The proposed alternatives are for a 58-mile limited access facility highway extending from Tybouts Corner on the north, where new Delaware Route 7 improvements are to terminate, to the Frederica and Felton areas south of Dover, including U.S. Routes 13 and 113. The regional context of the proposed project area is shown in Figure 1, Project Location Map. The final highway will consist of four lanes with a median divider.

The project study area, identified as the Route 13 Corridor and shown in Figure 2, was defined to include the areas 2 to 3 miles on either side of the existing U.S. Route 13 from Tybouts Corner at the northern end to the areas around Frederica and Felton along U.S. Routes 113 and 13 south of Dover. The area is characterized by farmland, forest, and wetlands with concentrations of residential, commercial, industrial, and public service uses in and around Dover, Odessa, Smyrna, and Middletown. The largest community and the main urban area within the study area is the Dover/Camden/Wyoming area, with a total population of over 61,000 people. It is also the most diverse of the communities in the study area with significant residential, commercial, industrial, and institutional development.

Smyrna/Clayton, Middletown and Odessa are the other major communites in the study area. Smyrna/Clayton is a residential and agricultural community with a population of over 12,000 people while Middletown has around 9,000 people. Odessa while smaller, is an important enclave of historic homes a few of which date from the colonial period. Significant commercial activity in Smyrna is located on Route 13. The areas around Dover have been growing rapidly in the past 15 to 20 years, with single-family home subdivisions being the largest land use. Continued growth is expected in these areas, along with commercial activities to serve the residential population. Areas west of Route 13 within the study area, away from the built-up municipalities, tend to be devoted to farming activities; areas

FIGURE 1
Project Location Map

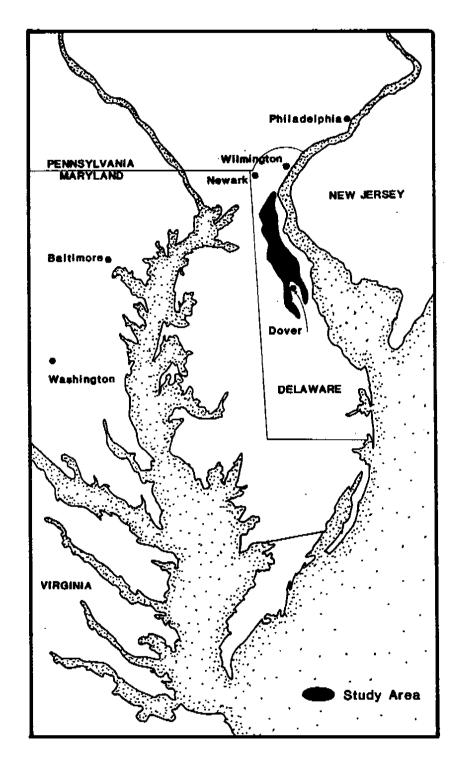
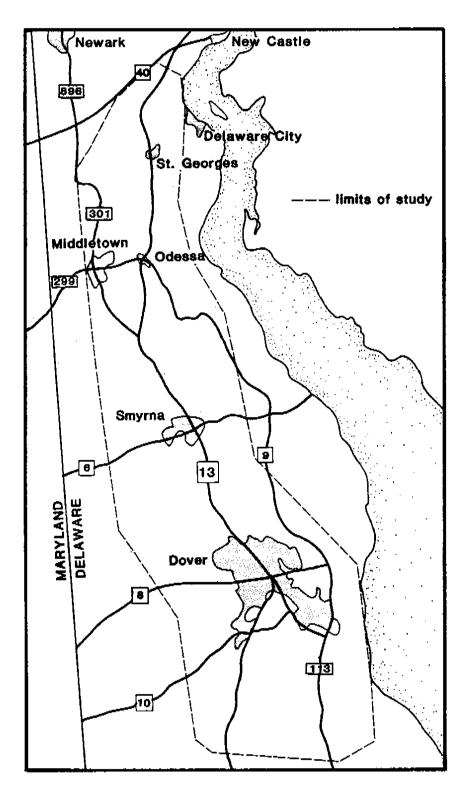


FIGURE 2
U.S. Route 13 Study Area



on the eastern side of the study area are generally devoted to farming and wetland areas.

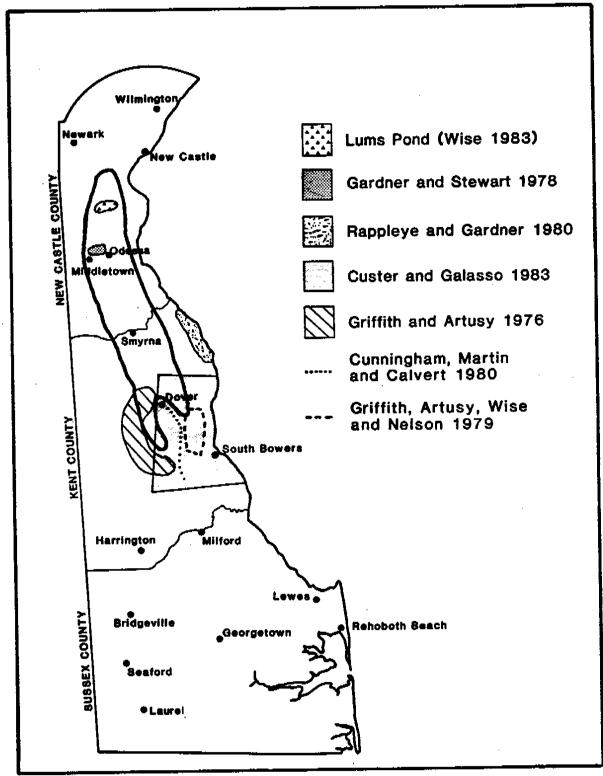
#### PREVIOUS ARCHAEOLOGICAL STUDIES

Prior to the beginning of the Route 13 planning study several archaeological studies had been carried out within the project study area (Figure 3). These studies include an archaeological survey of Lums Pond State Park (Wise 1983), a survey of the dualization of Route 113 in Dover (Cunningham et al. 1980), a sewer line survey of the north bank of the Approquinimink River between Middletown and Odessa (Gardner and Stewart 1978), a survey of cultural resources of St. Jones Neck (Delaware Division of Historical and Cultural Affairs 1979), a survey of portions of the Bombay Hook National Wildlife Refuge (Rappleye and Gardner 1980), a controlled sample survey of selected portions of the St. Jones and Murderkill drainages (Custer and Galasso 1983), and a survey of an early proposed alignment of the West Dover By-Pass (Griffith and Artusy 1976). Most of these studies dealt primarily with prehistoric archaeological resources; however, comprehensive architectural surveys of standing structures in Kent and New Castle Counties by the Delaware Bureau of Archaeology and Historic Preservation (BAHP) provided a data base on potential historic archaeological site locations.

To date, three cultural resource planning surveys have been carried out for the Route 13 Corridor. The first study (Custer et al. 1984) was an overview of the entire corridor and provided a guide to known locations of historic and prehistoric cultural resources. All known prehistoric archaeological sites were plotted on a series of attachment maps (Custer et al. 1984: Attachment I) and inventoried (Custer et al. 1984:149-155). In addition, a series of predictive maps (Custer et al. 1984: Attachment V) were developed utilizing synoptic analysis of LANDSAT sattelite imagery and logistical regression statistical techniques (Custer et al. 1984:76-102; Custer et al. 1986; Eveleigh et al. 1983; Eveleigh 1984). The predictive maps differentiated among areas with a greater than .75 probability of containing prehistoric sites, areas with a .50 to .75 probability, and areas with a prehistoric site probability of less than .50. Preliminary tests of the model indicated that the predictions were more than 90% accurate and accounted for more than 80% of the variability in the site location data.

All known standing structures in the study area recorded in the BAHP inventories were listed (Custer et al. 1984:193-215), tabulated (Custer et al. 1984:36-43), and mapped (Custer et al. 1984: Attachment II). Additionally, houses, farm complexes, stores, and other buildings recorded on early atlases of the project area, such as the Beers Atlas (1868), Rea and Price Atlas (1849), and Byles Map of Kent County (1859), were plotted (Custer et al. 1984: Attachment III) and listed (Custer et al. 1984: Appendix III). This data base provided a fairly complete sample of the project study area's potential historic archaeological

FIGURE 3
Previous Archaeological Studies



site locations. Each site was then assigned a significance rating based on its general potential for providing intact archaeological deposits and its potential for yielding data applicable to current research questions. And these significance ratings were mapped (Custer et al. 1984: Attachment IV). Areas with similar site significance from the pre-1800 and post-1800 eras were then mapped (Custer et al. 1984: Attachments VI and VII) as areas of different historic site location potential. Finally, areas with high prehistoric and historic site potential were plotted as cultural resource "sensitivity zones" (Figure 4). The result was the mapping of a series of areas where it was highly likely that the construction of Route 13 would adversely affect significant cultural resources.

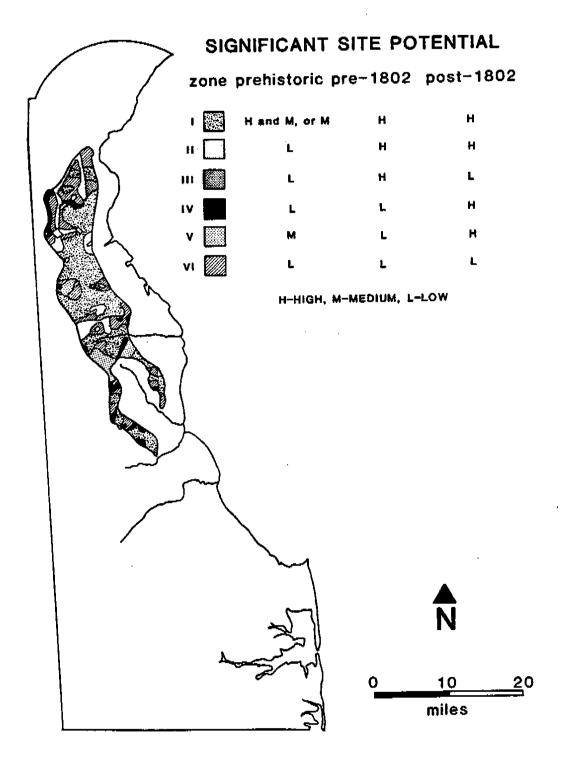
In order to provide more specific cultural resource planning information to guide alignment selection and highway design, field survey of the 13 most sensitive areas delimited by the Table 1 lists the initial planning study was undertaken. sensitive areas and Figure 5 shows their location. For the most part the most sensitive areas are associated with the locations where the proposed corridor crosses the region's major drainages. The Blackbird area is somewhat different in that it focuses on an area with many bay/basin features. Each area was subjected to field survey including surface survey and subsurface testing. Private artifact collections from sites in the areas were catalogued and analyzed. All potential historic site locations identified by BAHP standing structure inventories and historic atlases within the sensitive areas were field checked for their archaeological potential.

The results of these surveys were documented in two separate reports (Custer and Bachman 1986; Custer, Bachman, and Grettler 1986) and included detailed maps of cultural resources in each of the study areas. These maps were designed to provide information for highway planners when they determined the final alignments in the sensitive area. A summary of these findings (Custer and Cunningham 1986) was included as a technical support document for the Final Environmental Impact Statement and did help to minimize impact on the more important archaeological resources. However, because the adverse effects of the project on cultural resources had to be considered along with adverse effects upon wetlands, farmlands, and existing homes and businesses, not all adverse effects on cultural resources could be avoided.

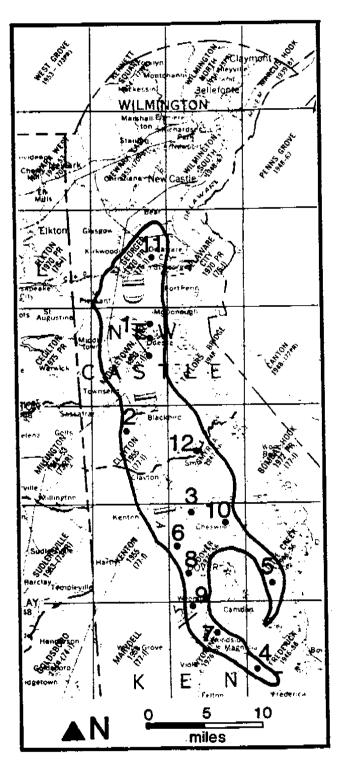
### THE ROLE OF A RESEARCH PLAN AND ARCHAEOLOGICAL RESOURCE MANAGEMENT PLAN

The next step to be undertaken in the archaeological research will be a Phase I field reconnaissance survey of the final alignment selected for construction. Figure 6 shows a plot of the most recently identified center line and the proposed impact zone extends approximately 200' to either side of this line. Some segments of the final alignment have already been surveyed during the planning survey of sensitive areas. Table 2 lists the prehistoric archaeological sites which are within the

FIGURE 4 Composite Map of Cultural Resources



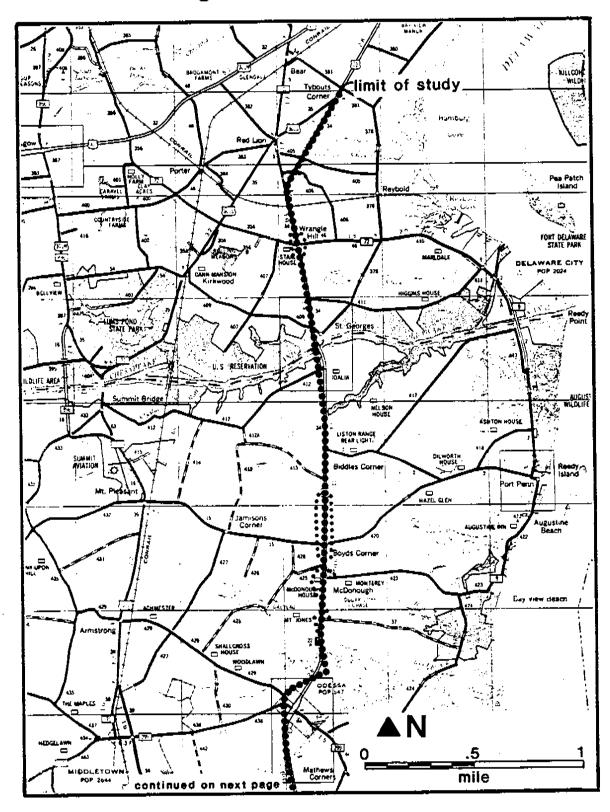
## FIGURE 5 Sensitive Area Locations



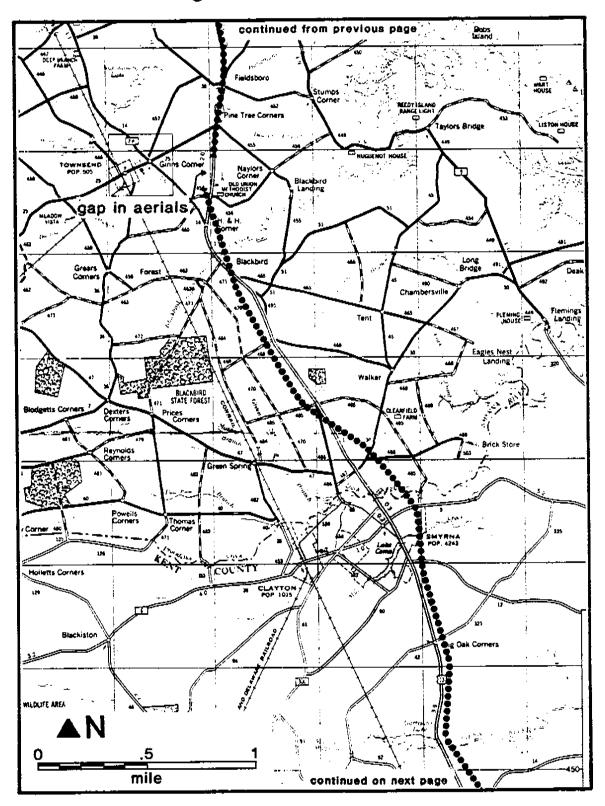
### TABLE 1 SPECIAL CULTURAL RESOURCE AREAS

- 1) Appoquinimink
- 2) Blackbird
- 3) Leipsic
- 4) Double Run/Spring Creek
- 5) Little River/Pipe Elm Branch
- 6) Hughes Crossing
- 7) Derby Pond
- 3) Chestnut Grove
- 9) Wyoming Lake
- 10) Dyke and Muddy Branches
- 11) St. Georges
- 12) Smyrna

FIGURE 6
Final Alignment - Route 13 Corridor



# FIGURE 6 CONTINUED Final Alignment - Route 13 Corridor



# FIGURE 6 CONTINUED Final Alignment - Route 13 Corridor

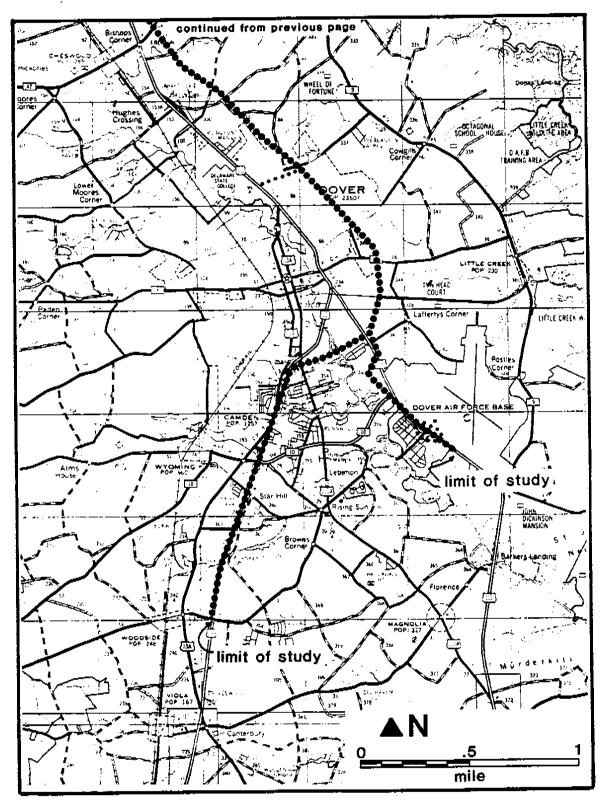


TABLE 2

PREHISTORIC SITES WITHIN THE DIRECT IMPACT ZONE

#### PERIOD COMPLEX

7NC-G-21 7NC-J-49	pre	available on microfiche historic flakes historic
7NC-J-48		
7NC-J-93		
7NC-J-97		<del></del>
7NC-J-99	Archaic	
7NC-J-134		
7NC-J-135		
7NC-J-136	<b></b>	
7K-C-194	<del></del>	
7K-C-204		<del></del>
7K-C-203		
7K-C-207		<b></b>
7K-C-208		
7K-D-22	no information	available on microfiche
7K-D-3*	Woodland I	Carey/Wolf Neck Delmarva Adena
7K-C-51	no information	available on microfiche

\* - National Register

(--- dash means flakes, Fcr, and other non-diagnostics were the only artifacts recovered)

final alignment and Table 3 lists historic sites. Figure 7 shows the location of the prehistoric sites and Figure 8 shows the location of the historic sites. Nonetheless, large portions of the alignment, at least 80% of the total, have not yet been surveyed. Because much of the unsurveyed portion of the alignment passes through high and medium probability zones for both historic and prehistoric cultural resources, it is expected that the field reconnaissance survey will find many new archaeological sites.

All Phase I and II testing will build upon the preliminary planning studies and background research accomplished to date for the segment (Custer et al. 1984; Custer and Bachman 1986; Custer, Bachman, and Grettler 1986; Custer and Cunningham 1986) and will comply with the standards for field investigations outlined by the Advisory Council for Historic Preservation (36 CFR Part 66 Draft: App. B). Phase I research methods will consist of pedestrian survey of the entire right-of-way (ROW). Special care will be taken when areas of predicted high site potential are surveyed. These high potential areas have been identified for both prehistoric and historic sites in prior studies. When necessary, subsurface testing will be undertaken in order to

TABLE 3
HISTORIC RESOURCES ROUTE 13 DIRECT IMPACT ZONE

1040	SITE	DATE	FUNCTION	TYPE
1032	1040		AGTEN	на
1033		1849-68	AGTEN	HÄ
1033	3	p1849	AGTEN	AH
N-1492  1800-25  EST  SS?  33  P1868  AGTEN  HA  34  P1849  AGTEN  HA  35  P1849  AGTEN  HA  36  P1849  AGTEN  HA  N-1235  1790  AGCX  SS?  37  1849-68  AGTEN  HA  1041  1849-68  AGTEN  HA  1042  1868-93  AGTEN  HA  1042  1868-93  AGTEN  HA  1038  P1849  AGCX  SS?  122  1849-68  AGCX  HA  116  1849-68  AGCX  HA  116  1849-68  AGCX  HA  116  1849-68  AGCX  N-5181  P1849  AGCX  SS  N-5187  P1849  AGCX  SS  N-5156  P1849  AGCX  SS  N-5156  P1849  AGCX  SS  N-5156  P1849  AGCX  SS  N-5154  1849-68  AGCX  SS  N-424*  mid 18th cen.  DWCX  SS  188  1849-68  1849-68  DWCX  HA  186  P1849  SCH  HA  189  1849-68  DWCX  HA  189  1849-68  DWCX  HA  189  1849-68  DWCX  HA  189  1849-68  DWCX  HA  180  1849-68  TENANT  HA  190  1849-68  TENANT  HA  191  1849-68  TENANT  HA  191  1849-68  TENANT  HA  190  1849-68  TENANT  HA  191  1849-68  TENANT  HA  191  1849-68  TENANT  HA  190  1849-68  TENANT  HA  191  1849-68  TENANT  HA  190  1849-68  TENANT  HA  191  1849-68  TENANT  HA  191  1849-68  TENANT  HA  190  1849-68  TENANT  HA  191  1849-68  TENANT  HA  191  1849-68  TENANT  HA  190  1849-68  TENANT  HA  191  1849-68  TENANT  HA  191  1849-68  TENANT  HA  191  1849-68  TENANT  HA  191  1849-68  TENANT  HA  190  1849-68  TENANT  HA  191  1849-68  TENANT  HA  191  1849-68  TENANT  HA  191  1849-68  TENANT  HA  190  1849-68  TENANT  HA  191  1849-68  TENANT  HA  191  1849-68  TENANT  HA  191  1849-68  TENANT  HA  190  1849-68  TENANT  HA  190  1849-68  TENANT  HA  191  1849-68  TENANT  HA  190  1849-68  TENANT  HA  190  1849-68  TENANT  HA  191  HA  190  1849-68  TENANT  HA  191  HA  190  1849-68  TENANT  HA  190  HA  190  1849-68  TENANT  HA  190  HA  190			AGTEN	
Pisson		1849-68	AGTEN	HA
PI868   AGTEN	== -	1800-25	EST	SS?
34 P1849 AGTEN HA 35 P1849 AGTEN HA 36 P1849 AGTEN HA N-1235 1790 AGCX SS? 37 1849-68 AGTEN HA 1041 1849-68 AGTEN HA 1042 1868-93 AGTEN HA 1042 1868-93 AGTEN HA 103 P1849 AGCX SS? 122 1849-68 AGCX HA 114 P1849 AGCX HA 116 1849-68 AGCX HA 114 P1849 AGCX SS? N-5187 P1849 AGCX SS N-5156 P1849 AGCX SS N-5156 P1849 AGCX SS N-5154 1849-68 AGCX SS N-5154 1849-68 AGCX SS N-124* mid 18th cen. DWCX SS 188 1849-68 AGCX SS N-188 1849-68 AGCX HA 186 P1849 SCH HA 186 P1849 SCH HA 186 P1849 SCH HA 187 1849-68 DWCX HA 189 1849-68 DWCX HA 180 1849-68 DWCX HA 181 1849-68 DWCX HA 182 TENANT HA 1849-68 AGCX SS? 1851 AGG-93 STRUC HA 1849-68 SCH HA 1849-68 SC		P1868	AGTEN	HA
N-1235   1790   AGTEN		P1849	AGTEN	
The state of the	35	P1849	AGTEN	HA
1849-68		P1849	AGTEN	
1041 1849-68 AGTEN HA 1042 1868-93 AGTEN HA 1042 1868-93 AGTEN HA 38 P1849 AGCX SS? 122 1849-68 AGCX HA 103 P1849 AGTEN HA 116 1849-68 AGCX HA 114 P1849 CHUR, CEM HA N-5181 P1849 AGCX SS? N-5187 P1849 AGCX SS N-5156 P1849 AGCX SS N-5154 1849-68 AGCX SS N-5154 1849-68 DWCX SS 188 1849-68 STRUC HA 187 1849-68 DWCX HA 1886 P1849 SCH HA 189 1849-68 DWCX, TENANT HA 190 1849-68 TENANT HA 191 1849-68 TENANT HA 191 1849-68 AGCX HA 192 AGCX SS 1849-68 AGCX SS 1849-68 TENANT HA 191 1849-68 TENANT HA 192 AGCX HA 193 AGTEN HA 194 AGCX HA 195 AGCX HA 195 AGCX HA 196 AGCX HA 197 AGCX HA 198 AGCX HA 199 AGCX HA 190 AGCX SS 1849-68 TENANT HA 191 AGCX HA 192 AGCX HA 193 AGTEN HA 194 AGCX HA 195 AGCX HA 196 AGCX SS 1905 CHUR, CEM HA 195875 P1868 DWCX, COMM SS? 1865 B468-93 STRUC HA 1849-68 STRUC HA 1855 B468-93 STRUC HA 1845 B45 B49-68 AGCX SS	N-1235	1790	AGCX	SS?
1042	37	1849-68	AGTEN	
Piston   P	1041		AGTEN	
122 1849-68 AGCX HA 103 P1849 AGTEN HA 116 1849-68 AGCX HA 114 P1849 CHUR, CEM HA N-5181 P1849 AGCX SS? N-5187 P1849 AGCX SS N-5156 P1849 AGCX SS N-5154 1849-68 AGCX SS N-5154 N49-68 AGCX SS N-424* mid 18th cen. DWCX SS 188 1849-68 STRUC HA 187 1849-68 DWCX HA 186 P1849 SCH HA 189 1849-68 DWCX, TENANT HA 189 1849-68 TENANT HA 190 1849-68 TENANT HA 191 1849-68 AGCX HA 191 1849-68 AGCX HA 192 SCH HA 193 AGTEN HA 194 SSS 1849-68 AGCX HA 1855 AGCX HA 1855 AGCX HA 1857 AGCX HA 1858 AGCX HA 1858 AGCX HA 1859 AGCX HA 1859 AGCX HA 1850 AGCX HA 1851 AGCX HA 1852 AGCX HA 1853 AGCX HA 1855 AGCX HA 1857 AGCX SS? 1851 AGGB-93 DWCX HA 1858 AGCX SS? 1851 AGGB-93 DWCX HA 1855 AGCX SS? 1851 AGGB-93 DWCX HA 1855 AGCX SS? 1851 AGGB-93 DWCX HA 1855 AGCX SS? 1851 AGGB-93 STRUC HA 1855 AGCX SS? 1868-93 STRUC HA 1855 AGCX SS? 1868-93 STRUC HA 1855 AGCX SS?	1042			
103				
116				
114				
N-5181 P1849 AGCX SS? N-5187 P1849 AGCX SS N-5156 P1849 AGCX SS N-5154 1849-68 AGCX SS N-424* mid 18th cen. DWCX SS 188 1849-68 DWCX HA 187 1849-68 DWCX HA 186 P1849 SCH HA 189 1849-68 DWCX, TENANT HA 189 1849-68 TENANT HA 190 1849-68 TENANT HA 191 1849-68 AGCX HA 1855 1849-68 AGCX HA 853 1849-68 STO, DWCX HA 8547 1849-68 STO, DWCX HA 1052 HA 8546 1849-68 AGTEN HA 855 STO, DWCX HA 855 STO, DWCX HA 855 STO, DWCX HA 856 STO, DWCX HA 857 STO, DWCX HA 8589 STO, DWCX HA 8589 STO, DWCX HA 859 STO, DWCX HA 851 STO HA 852 STO HA 853 STO HA 8546 STO HA 855 SCH HA 855 SCH HA 856 SCH HA 8575 STO HA 8575 STO HA 8585 SCH HA 8575 STRUC HA 875 STRUC SSS				
N-5187 P1849 AGCX SS N-5156 P1849 AGCX SS N-5154 1849-68 AGCX SS N-424* mid 18th cen. DWCX SS 188 1849-68 DWCX HA 187 1849-68 DWCX HA 186 P1849 SCH HA 189 1849-68 DWCX, TENANT HA 190 1849-68 TENANT HA 191 1849-68 TENANT HA 191 1849-68 AGCX HA 855 1849-68 AGCX HA 853 1849-68 DWCX HA 852 1849-68 STO, DWCX HA 1052 HA 8547 1849-68 STO, DWCX HA 1052 SAFEN HA 846 1849-68 AGTEN HA 846 1849-68 STO, DWCX SS? 851 1868-93 DWCX SS? 851 1868-93 DWCX HA 175 1849-68 STO HA 1849-68 STO HA 1849-68 STO HA 1849-68 STO HA 1849-68 SCH HA 1849-68 SCH HA 1849-68 SCH HA 1849-68 SCH HA 1855 SCH HA 1855 SCH HA 1856-93 STRUC HA 18575 P1868 DWCX, COMM SS? 1868-93 STRUC HA 1849-68 AGCX SS		P1849	*	
N-5156 N-5154 N-5154 N-5154 N-424* mid 18th cen. DWCX SS N-424* mid 18th cen. DWCX SS 188 1849-68 STRUC HA 187 1849-68 DWCX HA 186 P1849 SCH HA 189 1849-68 DWCX, TENANT HA 190 1849-68 TENANT HA 191 1849-68 TENANT HA 855 1849-68 B52 1849-68 DWCX HA 852 1849-68 STO,DWCX HA 1052 HA 847 1849-68 PO, WKSH HA 846 1849-68 AGTEN HA 846 1849-68 STO,DWCX HA 847 1849-68 STO,DWCX HA 848 STO,DWCX HA 848 STO,DWCX HA 849-68 STO,DWCX HA 846 STO,DWCX HA 847 STO,DWCX HA 848 STO,DWCX HA 848 STO,DWCX HA 846 STO,DWCX HA 847 SS? 851 STO HA 846 STO HA 847 STO HA 847 STO HA 848 STO STRUC HA 848 STRUC HA 845 STRUC HA 845 STRUC HA 845 STRUC HA 845				
N-5154				
N-424* mid 18th cen. DWCX SS 188 1849-68 STRUC HA 187 1849-68 DWCX HA 186 P1849 SCH HA 189 1849-68 DWCX, TENANT HA 914 1868-93 AGTEN HA 190 1849-68 TENANT HA 191 1849-68 AGCX HA 855 1849-68 DWCX HA 852 1849-68 DWCX HA 1052 HA 847 1849-68 STO, DWCX HA 1052 HA 846 1849-68 AGTEN HA N-5889 19th cen. DWCX, AGCX SS? 851 1868-93 DWCX HA 250 P1849 SCH HA 275 1849-68 SCH HA N-5875 1905 CHUR, CEM HA N-5876 P1868 DWCX, COMM SS? 885 1868-93 STRUC HA 845 SS				
188       1849-68       STRUC       HA         187       1849-68       DWCX       HA         186       P1849       SCH       HA         189       1849-68       DWCX, TENANT       HA         914       1868-93       AGTEN       HA         190       1849-68       TENANT       HA         191       1849-68       TENANT       HA         855       1849-68       AGCX       HA         853       1849-68       DWCX       HA         852       1849-68       STO, DWCX       HA         1052       HA         847       1849-68       PO, WKSH       HA         846       1849-68       AGTEN       HA         N-5889       19th cen.       DWCX, AGCX       SS?         851       1868-93       DWCX       HA         250       P1849       SCH       HA         275       1849-68       SCH       HA         N-5875       1905       CHUR, CEM       HA         N-5876       P1868       DWCX, COMM       SS?         885       1868-93       STRUC       HA         845       1849-68				
187       1849-68       DWCX       HA         186       P1849       SCH       HA         189       1849-68       DWCX, TENANT       HA         914       1868-93       AGTEN       HA         190       1849-68       TENANT       HA         191       1849-68       TENANT       HA         855       1849-68       AGCX       HA         853       1849-68       DWCX       HA         852       1849-68       STO, DWCX       HA         1052       HA         847       1849-68       PO, WKSH       HA         846       1849-68       AGTEN       HA         N-5889       19th cen.       DWCX, AGCX       SS?         851       1868-93       DWCX       HA         250       P1849       SCH       HA         275       1849-68       SCH       HA         N-5875       1905       CHUR, CEM       HA         N-5876       P1868       DWCX, COMM       SS?         885       1868-93       STRUC       HA         845       1849-68       AGCX       SS				
186       P1849       SCH       HA         189       1849-68       DWCX, TENANT       HA         914       1868-93       AGTEN       HA         190       1849-68       TENANT       HA         191       1849-68       TENANT       HA         855       1849-68       AGCX       HA         853       1849-68       DWCX       HA         852       1849-68       STO, DWCX       HA         1052       HA         847       1849-68       PO, WKSH       HA         846       1849-68       AGTEN       HA         N-5889       19th cen.       DWCX, AGCX       SS?         851       1868-93       DWCX       HA         848       1849-68       STO       HA         250       P1849       SCH       HA         275       1849-68       SCH       HA         N-5875       1905       CHUR, CEM       HA         N-5876       P1868       DWCX, COMM       SS?         885       1868-93       STRUC       HA         845       1849-68       AGCX       SS	188			
189				
914 1868-93 AGTEN HA 190 1849-68 TENANT HA 191 1849-68 TENANT HA 855 1849-68 AGCX HA 853 1849-68 DWCX HA 852 1849-68 STO, DWCX HA 1052 HA 846 1849-68 PO, WKSH HA 846 1849-68 AGTEN HA 851 1868-93 DWCX, AGCX SS? 851 1868-93 DWCX HA 848 1849-68 STO HA 850 P1849 SCH HA 851 1849-68 SCH HA 852 P1849-68 SCH HA 853 P1849-68 SCH HA 855 P1868 DWCX, COMM SS? 856 P1868 STRUC HA 8575 P1868 STRUC HA 8575 P1868 STRUC HA 8575 P1868 STRUC HA 8575 SS?				
190 1849-68 TENANT HA 191 1849-68 TENANT HA 855 1849-68 AGCX HA 853 1849-68 DWCX HA 852 1849-68 STO, DWCX HA 1052 HA 846 1849-68 PO, WKSH HA 846 1849-68 AGTEN HA 851 1868-93 DWCX, AGCX SS? 851 1868-93 DWCX HA 848 1849-68 STO HA 850 P1849 SCH HA 851 1849-68 SCH HA 852 P1849-68 SCH HA 853 P1868 DWCX, COMM SS? 854 P1868 STO HA 855 P1868 SCH HA 856 P1868 STO HA 8575 P1868 SCH HA 8575 SCH SCH HA 8575 SCH HA 8575 SCH SCH SS? 875 SCH SCH SS?				
191 1849-68 TENANT HA 855 1849-68 AGCX HA 853 1849-68 DWCX HA 852 1849-68 STO, DWCX HA 1052 HA 846 1849-68 PO, WKSH HA 846 1849-68 AGTEN HA 851 1868-93 DWCX, AGCX SS? 851 1868-93 DWCX HA 848 1849-68 STO HA 250 P1849 SCH HA 275 1849-68 SCH HA 875876 P1868 DWCX, COMM SS? 885 1868-93 STRUC HA 845 1849-68 AGCX SS	_			
855				
853				
852 1849-68 STO,DWCX HA 1052 HA 847 1849-68 PO, WKSH HA 846 1849-68 AGTEN HA N-5889 19th cen. DWCX, AGCX SS? 851 1868-93 DWCX HA 848 1849-68 STO HA 250 P1849 SCH HA 275 1849-68 SCH HA N-5875 1905 CHUR, CEM HA N-5876 P1868 DWCX, COMM SS? 885 1868-93 STRUC HA 845 1849-68 AGCX SS				
1052 847 1849-68 PO, WKSH HA 846 1849-68 N-5889 19th cen. DWCX, AGCX SS? 851 1868-93 DWCX HA 848 1849-68 STO HA 250 P1849 SCH HA 275 1849-68 SCH HA N-5875 1905 CHUR, CEM HA N-5876 P1868 DWCX, COMM SS? 885 1868-93 STRUC HA 845				
847 1849-68 PO, WKSH HA 846 1849-68 AGTEN HA N-5889 19th cen. DWCX, AGCX SS? 851 1868-93 DWCX HA 848 1849-68 STO HA 250 P1849 SCH HA 275 1849-68 SCH HA N-5875 1905 CHUR, CEM HA N-5876 P1868 DWCX, COMM SS? 885 1868-93 STRUC HA 845 1849-68 AGCX SS		1045-00	BIOIDHON	
846       1849-68       AGTEN       HA         N-5889       19th cen.       DWCX, AGCX       SS?         851       1868-93       DWCX       HA         848       1849-68       STO       HA         250       P1849       SCH       HA         275       1849-68       SCH       HA         N-5875       1905       CHUR, CEM       HA         N-5876       P1868       DWCX, COMM       SS?         885       1868-93       STRUC       HA         845       1849-68       AGCX       SS		1849-68	PO WKSH	
N-5889 19th cen. DWCX, AGCX SS? 851 1868-93 DWCX HA 848 1849-68 STO HA 250 P1849 SCH HA 275 1849-68 SCH HA N-5875 1905 CHUR, CEM HA N-5876 P1868 DWCX, COMM SS? 885 1868-93 STRUC HA 845 1849-68 AGCX SS				
851 1868-93 DWCX HA 848 1849-68 STO HA 250 P1849 SCH HA 275 1849-68 SCH HA N-5875 1905 CHUR, CEM HA N-5876 P1868 DWCX, COMM SS? 885 1868-93 STRUC HA 845 1849-68 AGCX SS				
848       1849-68       STO       HA         250       P1849       SCH       HA         275       1849-68       SCH       HA         N-5875       1905       CHUR, CEM       HA         N-5876       P1868       DWCX, COMM       SS?         885       1868-93       STRUC       HA         845       1849-68       AGCX       SS	•			
250 P1849 SCH HA 275 1849-68 SCH HA N-5875 1905 CHUR, CEM HA N-5876 P1868 DWCX, COMM SS? 885 1868-93 STRUC HA 845 1849-68 AGCX SS				
275 1849-68 SCH HA N-5875 1905 CHUR, CEM HA N-5876 P1868 DWCX, COMM SS? 885 1868-93 STRUC HA 845 1849-68 AGCX SS			·-	
N-5875 1905 CHUR, CEM HA N-5876 P1868 DWCX, COMM SS? 885 1868-93 STRUC HA 845 1849-68 AGCX SS		_		
N-5876 P1868 DWCX, COMM SS? 885 1868-93 STRUC HA 845 1849-68 AGCX SS				
885 1868-93 STRUC HA 845 1849-68 AGCX SS	N-5876	<b>P</b> 1868		
845 1849-68 AGCX SS				
			FUNCTION	TYPE

TABLE 3 (cont.)
HISTORIC RESOURCES ROUTE 13 DIRECT IMPACT ZONE

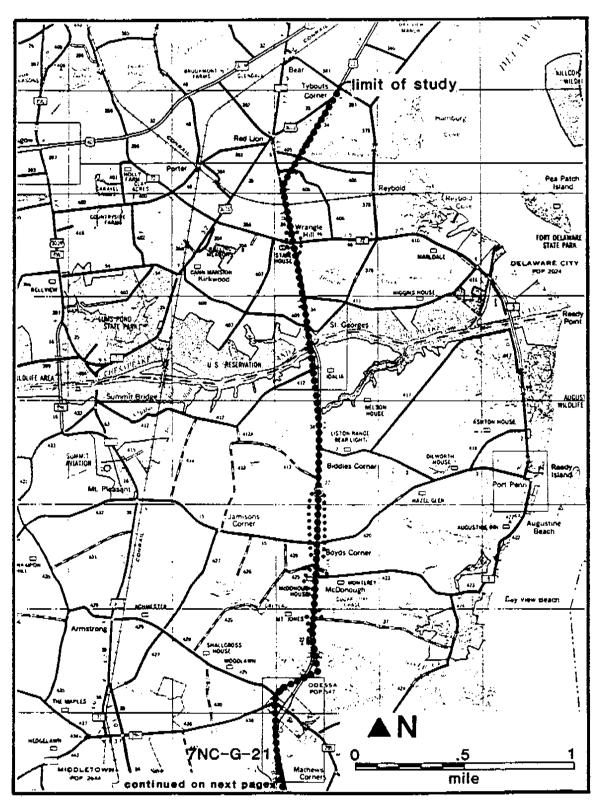
SITE	DATE	FUNCTION	TYPE
844	1868-93	DWCX	на
843	1868-93	DWCX	HA
842 284	1849-68 P1849	AGTEN AGCX	HA SS?
327	1849-68	AGCX	HА
326 325	P1849 1849-68	SCH AGCX	HA HA
N-6272	P1849	AGCX	SS
416 K-996	1849-68	AGCX	HA SS
K-487			SS?
K-1009 K-1003	1945 1900-10	MANUFY DWCX	SS? SS?
K-1004	1900	STRUC	SS?

#### KEY TO TABLE 3

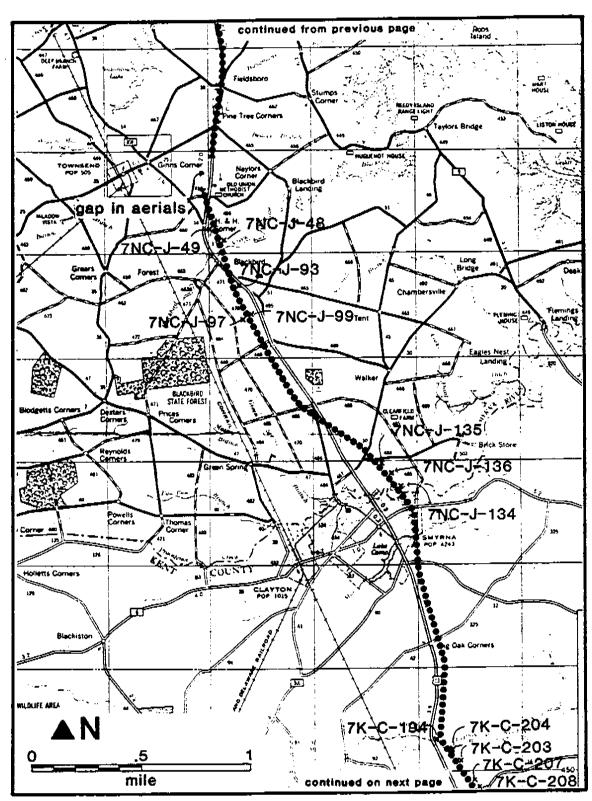
AGCX	-	Agricultural Complex
AGTEN	_	Agriclutural Tenant Dwelling/Farm
BRID	-	Bridge
ÇEM	_	Cemetary
CHUR	_	Church
COMM	_	Commerical Structure
DWCX	_	Dwelling Complex
DW	_	Dwelling
EST	-	Estate
MANUFY	_	Manufactory
PO	_	Post Office
SCH	_	School
SERVST	-	Service Station
STO	-	Store
STRUC		Structure
TENANT	_	Tenant House
WKSH	-	Workshop

<sup>\* -</sup> NATIONAL REGISTER ? - POSSIBILY REMOVED STRUCTURE SS - STANDING STRUCTURE HA - HISTORIC ARCHAEOLOGICAL

FIGURE 7
Location of Prehistoric Sites in Final Alignment



## FIGURE 7 CONTINUED Location of Prehistoric Sites in Final Alignment



# FIGURE 7 CONTINUED Location of Prehistoric Sites in Final Alignment

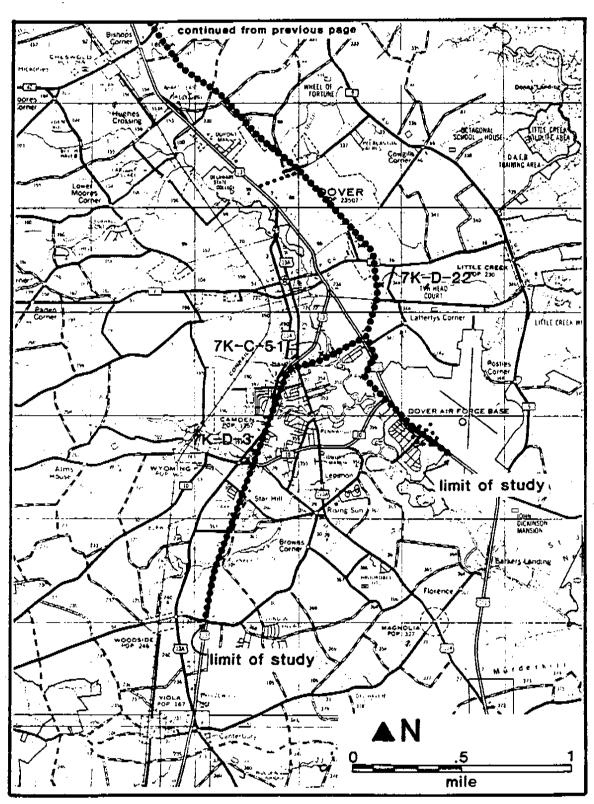
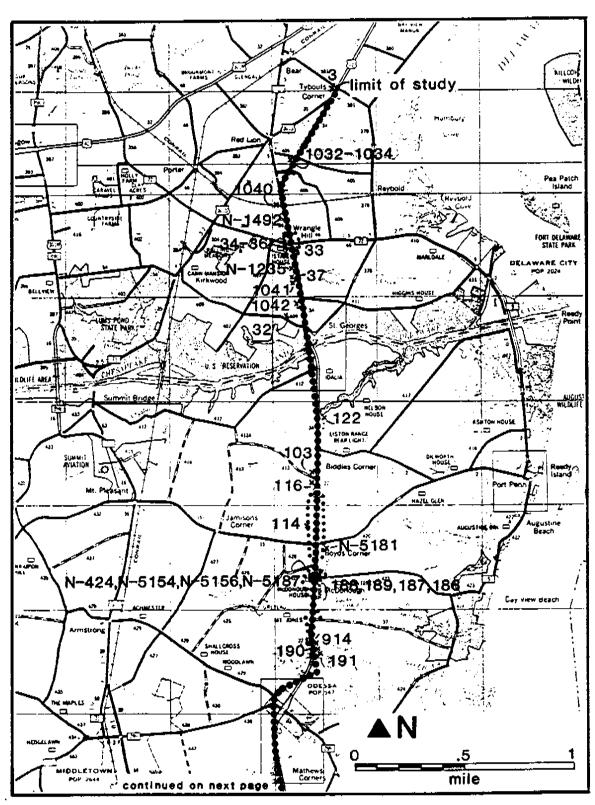


FIGURE 8
Location of Historic Sites in Final Alignment



## FIGURE 8 CONTINUED Location of Historic Sites in Final Alignment

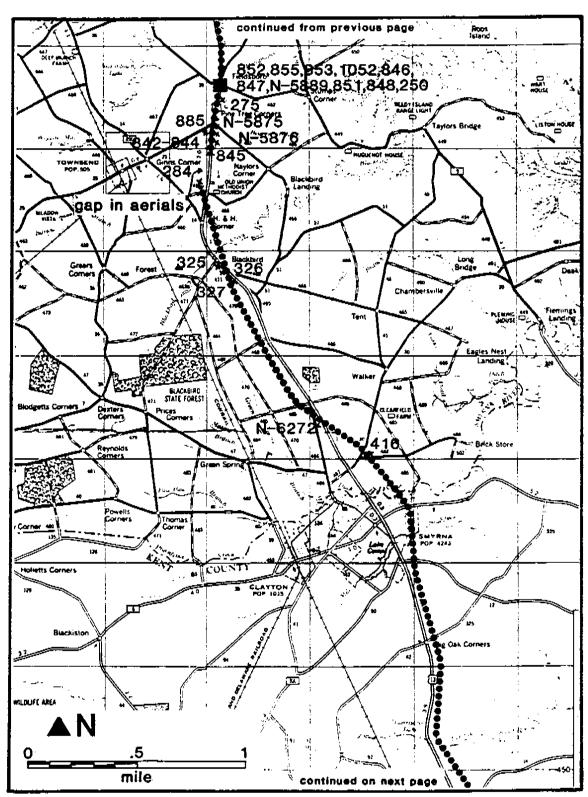
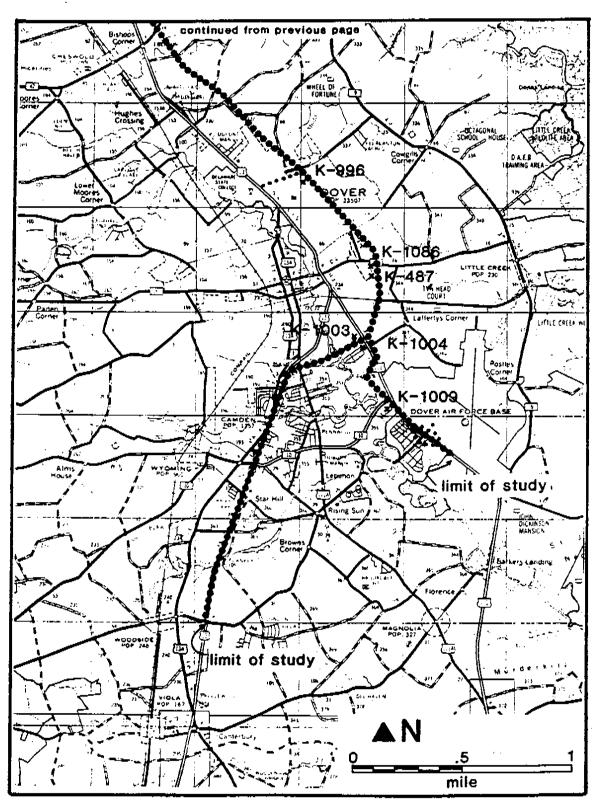


FIGURE 8 CONTINUED

Location of Historic Sites in Final Alignment



identify sites where landscapes are buried or where vegetation cover is heavy. Special attention will be taken in the testing of areas where the potential for unplowed and buried landscapes is high. It should also be noted that remote sensing survey, such as magnetometer work, may be necessary to search for submerged vessels in the vicinity of the historic landings.

The sites identified during the Phase I survey of the final alignment will have to be evaluated for their eligibility for listing in the National Register of Historic Places in a Phase II site investigation survey. In the case of archaeological sites, eligibility for the National Register of Historic Places is determined by the potential of a site to produce data germane to recognized research questions of interest (Raab and King, Hickman, and Berg 1977). Therefore, there is a 1977: critical need to identify the major regional research questions for the Route 13 Corridor. This plan will identify these research topics and will outline the types of historic and prehistoric archaeological sites which may be likely to provide data pertinent to these research questions, and which may be eligible for listing in the National Register of Historic Places given that the sites possess sufficient integrity. It is hoped that listing of research questions, and classes of potentially significant archaeological sites, will facilitate the development of determination-of-eligibility documentation and Phase III data recovery survey proposals.

It is expected that Phase I testing will identify all sites with the final alignment and provide an initial assessment of which sites will require Phase II testing. For some prehistoric sites, such as small upland lithic scatters in plowed areas with no subsurface integrity, there is no need for a detailed Phase II study to determine their significance. However, all prehistoric sites which exhibit either the potential for subsurface integrity, complex internal site structure, or large numbers of artifacts will be subjected to Phase II testing. For historic sites, of the sites in the final alignment identified during Phase I survey a sample will be selected for Phase II testing. All historic sites predating 1780 will be subjected to Phase II testing along with a large proportion of historic sites dating between 1780 and 1830. A stratified sample of historic sites dating between 1830 and 1900 would be subjected to Phase II testing and the sample could be stratified by functional types noted in Table 2, such as agricultural tenant, estate, owneroccupied agricultural complex, non-agricultural dwelling, store, and post office/workshop. No twentieth century sites and no service stations, schools, bridges, churches, or historic cemeteries will be subjected to Phase II testing. Site integrity and location with respect to the final alignment right-of-way will also be considered with respect to the sampling design.

Phase II testing will consist of intensive test excavations which will determine the eligibility of the sites discovered during Phase I testing for listing on the National Register of Historic Places. Specifically, Phase II testing will determine

the contextual integrity of sites, their spatial limits with respect to the proposed ROW, and their research significance. Specific field methods used at each site will vary, but generally they will include shovel test pits at regular intervals, 1-meter square test units, and controlled surface collections. It should also be noted that prior research has shown that a large, although undertermined, number of bay/basin features are found within the proposed ROW (Figure 9). These sites are the locus of many prehistoric sites and the bay/basin features are themselves important sources of paleoenvironmental information, such as pollen and macrofossils (Custer and Bachman 1986). Therefore, collection and analysis of fossil pollen data and geomorphological data from these features is necessary within the context of Phase II archaeological testing.

One prehistoric archaeological site, Carey Farm (7K-D-3), listed on the National Register of Historic Places will be impacted by the project (Figure 10). Phase II study of this site will require better definition of the site's limits so that the effects of the project upon the site can be determined and the need for data recovery addressed.

#### ENVIRONMENTAL SETTING

Before discussing the cultural resources, it is necessary to consider the environmental setting of the study area. In order to understand the regional prehistory of the present study it is first necessary to review the region's environments through time. The present study area is located in Delaware's High Coastal Plain. For the study of the prehistoric and historic resources of the region, a number of varied environmental zones are recognized in the High Coastal Plain (Figure 11). Each of these zones is described below and the descriptions are derived from the work of Custer (1984a).

High Coastal Plain - Located between the Fall Line and the Smyrna River, the High Coastal Plain represents the southeastern extension of the coarse gravels of Pleistocene (Columbia) sediments in Delaware (Jordan 1964:40). A rolling topography is present and elevation differences range up to 16 meters (50 feet) from the headlands bordering high order streams and adjacent floodplain marshes. These differences are sufficient to cause differential distributions of plant and animal species (Braun 1967:246-247). Watercourses are deeply incised and are lined by a veneer of relatively recent sediments that is thin along the upper reaches of the drainages and thickens moving toward their mouths (Kraft et al. 1976:13). Most streams are not tidal and the freshwater/saltwater mix allows for a wide range of Soils include a variety of well-drained and poorly drained settings that are distributed in a mosaic pattern across the region.

Low Coastal Plain - The Low Coastal Plain includes most of Kent County and most of the project area. It is underlain by the sands of the Columbia Formation which have been extensively

FIGURE 9
Final Alignment and Potential Bay/Basin Sites

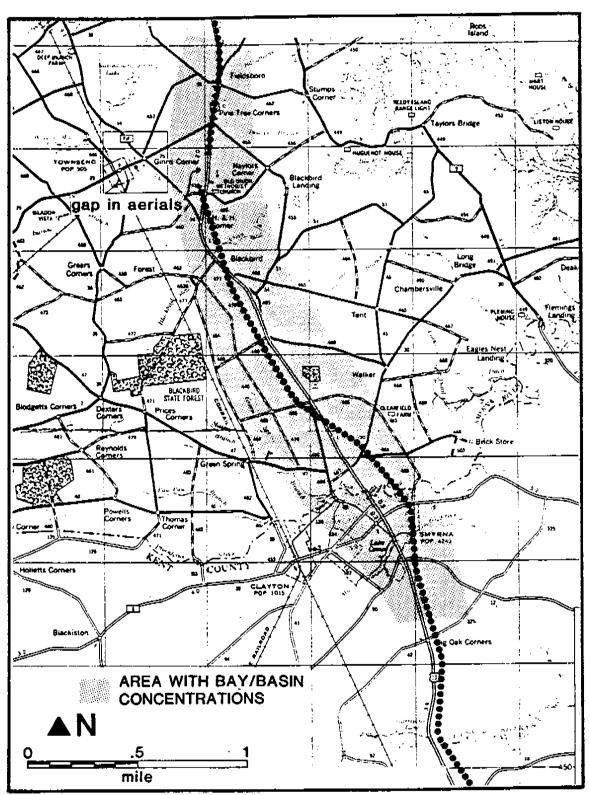


FIGURE 10

Carey Farm Site Location

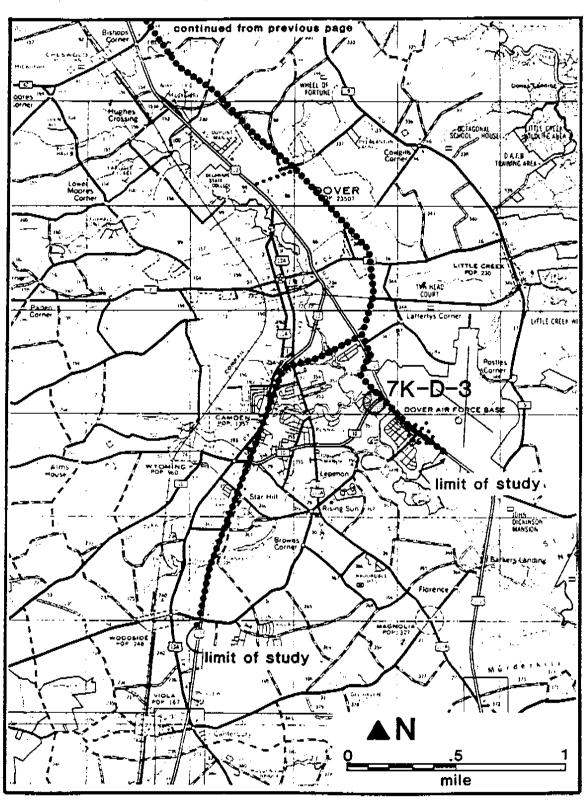
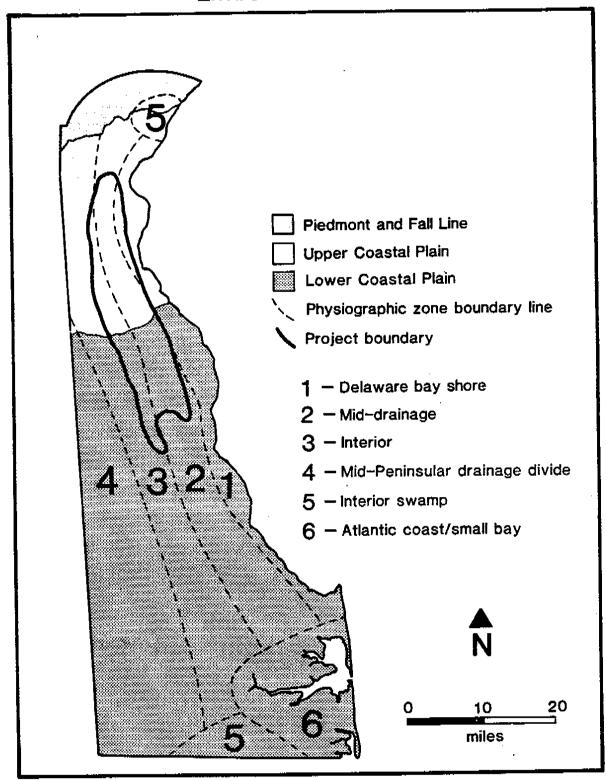


FIGURE 11
Environmental Zones



reworked to a very flat and relatively featureless landscape (Delaware Geological Survey 1976). Elevation differences range up to 10 meters (30 feet) and these small differences are moderated by long and gradual slopes. River systems are tidal through most of their middle and lower reaches with extensive marshes found along the Delaware Bay. These riverine systems would combine a wide variety of evironmental settings and resources and are especially attractive human habitation areas. Much of the area is well-drained; however, there are some extensive areas of poor drainage.

Although these two major physiographic zones provide one way of organizing a study of the Coastal Plain's cultural resources, they do obscure some additional significant environmental differences. These additional sources of environmental variability are generally distributed in broad belts parallel to the Delaware River and Bay shore. Each is described below and depicted in Figure 11.

Mid-Peninsular Drainage Divide - Representing the "spine" of the Delmarva Peninsula, this area is defined by the stretch of low, rolling topography that separates the headwaters of streams that drain into the Delaware River from streams that drain into the Chesapeake Bay. Elevation differences are slight and flowing surface water is restricted to the low order headwaters of the larger streams and rivers. Additional water sources of this zone include a number of swamps that have formed in areas of poorly drained soils surrounded by sand ridges. Bay/basin features, known locally as "whale-wallows", represent another water source in this area. Geomorphological evidence indicates that they were formed during the Pleistocene and many seem to have held water, at least seasonally, ever since (Rasmussen 1958:82). combination of headwater drainages, swampy areas, and bay/basin features with interspersed well-drained areas creates a mosaic of edaphic settings. Only a small section of the project area, between Pine Tree Corners and Flemings Landing falls within this

Delaware Shore - Included in the Delaware Shore zone are the remnant terraces of the Delaware River as well as the various tidal marshes that fringe the Delaware River and the Delaware Bay. These marshes are found throughout the area and often extend well up the drainages from the river and bay shore. Soils in the area are generally poorly drained; however, pockets of well-drained soils in the areas of higher elevation may be found. Only the eastern edges of the project area are included in this zone.

Mid-Drainage - The Mid-Drainage zone is located between the Delaware Shore and Mid-Peninsular Drainage Divide zones and includes the majority of the study area. The modern tidal limit along the drainages marks the center of this zone and the major drainages and their tributaries are fresh throughout the inland portion of the zone. Some tidal marshes and poorly drained floodplains are found along the major drainages. Well-drained

soils are found on upper terraces of the drainages and on isolated headlands between the major drainages and their tributaries. The extensive combination of brackish and freshwater resources makes this zone one of the richest in Delaware for hunters and gatherers and most of the final alignment falls within this zone.

It should be noted that the locations of these zones have not remained constant since the end of the Pleistocene because some zones have been subjected to extensive landscape modification. The most important factor in this landscape modification is post-Pleistocene sea level rise. Kraft et al. (1976) note that sea level has been rising along the Atlantic Coast for the past 12,000 years and this sea level rise has transformed the Delaware River of 10,000 B.C. into the current drowned estuary. Many old land surfaces have become submerged and the configuration of the Delaware River and Bay have changed dramatically. In terms of the study area, these effects would be most prevalent in the eastern half of the Mid-Drainage zone and the River Shore zone.

#### PREHISTORIC ARCHAEOLOGICAL RESOURCES

The following discussion of prehistoric cultural resources consists of two parts: a brief summary of the local prehistory, and a discussion of regional research questions that pertain specifically to Delaware's Coastal Plain with a listing of the classes of prehistoric archaeological sites which are most likely to contribute data pertinent to these research questions.

#### REGIONAL PREHISTORY

This summary of the regional prehistory is abstracted from Custer (1984a). The prehistoric archaeological record of the Delaware Coastal Plain can be divided into four large blocks of time: The Paleo-Indian Period (ca. 12,000 B.C. - 6500 B.C.), the Archaic Period (6500 B.C. - 3000 B.C.), the Woodland I Period (3000 B.C. - A.D. 1000), and the Woodland II Period (A.D. 1000 - A.D. 1650). A fifth time period, the Contact Period may also be considered and spans from A.D. 1650 to A.D. 1750, the approximate date of the final Indian habitation of Delaware in anything resembling their pre-European Contact form. Each of these periods is described below.

Paleo-Indian Period (12,000 B.C. - 6500 B.C.) - The Paleo-Indian Period encompasses the time period of the final retreat of Pleistocene glacial conditions from Eastern North America and establishment of more modern Holocene environments. The distinctive feature of the Paleo-Indian Period is an adaptation to the cold, and alternately wet and dry conditions at the end of the Pleistocene and the beginning of the Holocene. This adaptation was primarily based on hunting and gathering with hunting providing a large portion of the diet. Hunted animals may have included now-extinct megafauna and moose. A mosaic of

deciduous, boreal, and grassland environments would have provided a large number of productive habitats for these game animals in central Delaware and watering areas would have been particularly good hunting settings.

Tool kits of the people who lived at this time were oriented toward the procurement and processing of hunted animal resources. A preference for high quality lithic materials is noted in the stone tool kits and careful resharpening and maintenance of tools in common. A mobile lifestyle moving among the game attractive environments is hypothesized with the social organizations being based upon single and multiple family bands. Throughout the 5500 year time span of the period, the basic adaptation remains relatively constant with some modifications being seen as Holocene environments appear at the end of the Paleo-Indian Period.

Numerous Paleo-Indian sites are noted for the Delaware Coastal Plain. Most of the sites are associated with poorly drained swampy areas and include the Hughes Paleo-Indian complex near Felton.

Archaic Period (6500 B.C. - 3000 B.C.) - The Archaic Period is characterized by a series of adaptations to the newly emerged full Holocene environments. These environments differed from earlier ones and were dominated by mesic forests of oak and hemlock. A reduction in open grasslands in the face of warm and wet conditions caused the extinction of many of the grazing animals hunted during Paleo-Indian times; however, browsing species such as deer flourished. Sea level rise is also associated with the beginning of the Holocene in Delaware. The major effect of the sea level rise would have been to raise the local water table, which helped to create a number of large interior swamps. Adapations changed from the hunting focus of the Paleo-Indian to a more generalized foraging pattern in which plant food resources played a more important role. Large swamp settings apparently supported large base camps, but none are known from the study area. A number of small procurement sites in favorable hunting and gathering locales such as bay/basin features are known from Delaware's Coastal Plain.

Tool kits were more generalized than earlier Paleo-Indian tool kits and showed a wider array of plant processing tools such as grinding stones, mortars, and pestles. A mobile lifestyle was probably common with a wide range of resources and settings utilized on a seasonal basis. A shifting band level organization which saw the waxing and waning of group size in relation to resource availability is evident. Known sites include large base camps such as the Clyde Farm Site in northern Delaware and smaller processing sites located at a variety of locations and environmental settings.

**Woodland I Period** (3000 B.C. - A.D. 1000) - The Woodland I Period can be correlated with a dramatic change in local climates and environments that seem to be part of events occurring

throughout the Middle Atlantic region. A period of shifting wet and dry climates lasts from ca. 3000 B.C. to 1000 B.C. and in some areas mesic forests were replaced by xeric forests of oak and hickory. Grasslands also again became common. Some interior streams dried up; however, the overall effect of the environmental change was an alteration of the environment, not a degradation. Continued sea level rise and a reduction in its rate also made many areas of the Delaware River and Bay shore the sites of large brackish water marshes which are especially high The major changes in environment and resource in productivity. distributions caused a radical shift in adaptations for prehistoric groups. Important areas for settlements include the major river floodplains and estuarine swamp areas. Large base camps with fairly large numbers of people are evident in many settings in the Delaware Coastal Plain, such as the Barker's Landing, Coverdale, Hell Island, and Robbins Farm sites. sites seem to have supported many more people than previous base camp sites and may have been occupied on a year-round basis. overall tendency is toward a more sedentary lifestyle.

The tool kits show some minor variations as well as some major additions from previous Archaic tool kits. Plant processing tools become increasingly common and seem to indicate an intensive harvesting of wild plant foods that may have approached the efficiency of agriculture by the end of the Woodland I Period. Chipped stone tools changed little from the preceding Archaic Period; however, broad-blade, knife-like processing tools became more prevalent. The addition of stone, and then ceramic, containers is also seen. These items allowed the more efficient cooking of certain types of food and may also have functioned for storage of certain surplus plant foods. Storage pits and semi-subterranean houses are also known for the Delaware Coastal Plain during this period from the numerous sites.

Social organizations also seem to have undergone radical changes during this period. With the onset of relatively sedentary lifestyles and intensified food production, which might have produced occasional surpluses, incipient ranked societies began to develop as indicated by the presence of 1) extensive trade and exchange in lithic materials for tools as well as nonutilitarian artifacts, 2) caching of special artifact forms and utilization of artifacts manufactured from exotic raw materials. The data from cemeteries of the Delmarva Adena Complex (ca. 500 B.C. to A.D. 0), such as the Frederica Adena Site and the St. Jones Adena Site (Thomas 1976), indicate that certain individuals had special status in these societies and the existence of a simple ranked social organization is hypothesized. Similar data from the Island Field Site show that these organizations lasted up until A.D. 1000, although they may not have always been present throughout all of the Woodland I Period. In any event, by the end of the Woodland I Period a relatively sedentary lifestyle is evident in Delaware's Coastal Plain. It should also be noted that the greatest number of archaeological sites in the project area date to the Woodland I Period and the Mid-Drainage

zone, within which most of the alignment is located, is the focus of most of the important sites of this period.

Woodland II Period (A.D. 1000 - A.D. 1650) - In many areas of the Middle Atlantic, the Woodland II Period is marked by the appearance of agriculture food production systems; however, in the Delaware Coastal Plain there are no clear indications of such a shift. Some of the settlements of the Woodland I Period, especially the large base camps, were also occupied during the Woodland II Period and very few changes in basic lifestyles and overall artifact assemblages are evident. Intensive plant utilization and hunting remained the major subsistence activities up to European Contact. There is some evidence, nonetheless, of an increasing reliance on plant foods and coastal resources throughout the Woodland II Period in the study area. Social organization changes are evidenced by a collapse of the trade and exchange networks and the end of the appearance of elaborate cemeteries.

Contact Period (A.D. 1650 - A.D. 1750) - The Contact Period is an enigmatic period of the archaeological record of Delaware which begins with the arrival of the first substantial numbers of Europeans in Delaware. The time period is enigmatic because no Native American archaeological sites that clearly date to this period have yet been discovered in Delaware. A number of sites from the Contact Period are known in surrounding areas such as southeastern Pennsylvania, nonetheless. It seems clear that Native American groups of Delaware did not participate in much interaction with Europeans and were under the domination of the Susquehannock Indians of southern Lancaster County, Pennsylvania. The Contact Period ends with the virtual extinction of Native American lifeways in the Middle Atlantic area except for a few remnant groups.

#### RESEARCH QUESTIONS AND SITE SIGNIFICANCE

The following discussion of prehistoric research questions is drawn from general studies of Delaware prehistory (Custer 1984a; 1986), the state plan for the management of prehistoric cultural resources (Custer 1983), and local research questions noted in earlier studies of the Route 13 Corridor (Custer et al. 1984; Custer and Bachman 1986; Custer, Bachman, and Grettler 1986). Research questions associated with specific time periods are discussed first and then more general research issues are noted. In the discussions of research questions, sample sites from both the entire Route 13 Corridor and the specific final alignment are noted. Sites from the entire corridor are noted because they serve as examples of classes of sites which may be identified during the Phase I study of the final alignment. However, it should be understood that only those eligible sites located in the impact zone of the final alignment will be subjected to Phase III excavations.

#### Paleo-Indian Period

Paleo-Indian sites are relatively rare throughout Delaware and the Delmarva Peninsula and the state plan for the management of prehistoric archaeological resources notes that basic site recording and description are the main research goals for this time period (Custer 1983). It is also suggested that basic data recording and description be done in a problem-oriented framework. Existing Paleo-Indian site location models (Gardner 1977; Custer, Cavallo, and Stewart 1983), which stress poorly drained settings and high quality cryptocrystalline outcrops as foci of Paleo-Indian settlement, are the suggested research framework.

To date, no sites with fluted points have been found in any of the planning surveys. However, several sites produced late Paleo-Indian points, including Dalton/Hardaway, Kirk, and Palmer varieties (Table 4). It should be noted that none of the sites listed in the final alignment produced diagnostic Late Paleo-Indian artifacts. The planning survey of the northern study area discovered no Paleo-Indian sites; although three Kirk-like points were found at dispersed locations (Table 4). The survey of the southern areas yielded Paleo-Indian materials from 12 sites and 8 of these contained numerous specimens (Table 4). These multiple point finds indicate sites where activity was concentrated, as compared to dispersed hunting or procurement locales. Particularly interesting are the potential base camp sites (Table which include seven from the Leitzinger/Chapman collection (Custer, Bachman, and Grettler 1986: Appendix II) and the single site comprising the Deneumoustier collection (Custer, Bachman, and Grettler 1986: Appendix III). These sites are primarily located in the Mid-Drainage and Mid-Peninsular Drainage Divide zones and appear to be somewhat similar to the Hughes Early Man Any of would be Complex (Custer 1984a). these sites considered to be potentially eligible for listing in the National Register of Historic Places. It is also highly likely that these sites will be associated with buried Pleistocene/early Holocene river edge swamp deposits similar to the Dill Farm Site (Custer and Griffith 1984). These types of sites would provide valuable paleoenvironmental data and would probably need to be investigated as a part of data recovery projects, should any be encountered in the survey of the final alignment.

SAMPLE PALEO-INDIAN PERIOD	SITES PROM ROUTE 13 CORRIDOR
Possible Base Camps	Possible Procurement Sites

TABLE 4

7K-C-86A 7K-C-86C	7K-C-88 7K-C-90	7NC-H-39 7NC-H-73 7NC- I-105	7K-D-46 7K-A-51 7K-A-69
7K-C-87A	7K-D-21	7NC-J-105	/K-A-03
7K-C-87B	7K-C-344	7K-C-299	

With regard to site location data, the low density of Paleo-Indian sites in all of the survey areas is somewhat surprising. For example, it is somewhat surprising that no Paleo-Indian materials were recovered from the large areas surveyed along the Appoquinimink River. Although the Appoquinimink River drainage is outside the known, and predicted, concentrations of Paleo-Indian sites (Custer 1983:38-47), the occurrence of some kind of small procurement sites, such as 7NC-D-70 (Custer, Catts, and Bachman 1982), associated with a springhead or small swamp would be expected. It could be possible that older sites have been destroyed on the heavily eroded landscapes of the Appoquinimink, or Paleo-Indian site densities outside of the known and predicted concentration zones are truly quite low. Further detailed surveys are necessary to address this research issue.

Another research issue on Paleo-Indian site locations concerns Paleo-Indian utilization of bay/basin features. Bay/basin features have been recognized as important loci of archaeological sites for a number of years and many bay/basins are located within the final alignment. The first consideration of their role in prehistoric settlement subsistence systems was provided by Bonfiglio and Cresson (1978) who studied sites associated with bay/basin features in New Jersey. Ever since then their importance has been recognized in numerous overviews especially for the pre-3000 B.C. time period (Custer 1984a:58-59, 72; Kraft and Mounier 1982). Although most researchers agree about the importance of these sites for prehistoric peoples, there is not complete agreement as to their origin. Bonfiglio and Cresson (1978) feel that these features are of periglacial origin and refer to them as "pingoes". However, it is not clear that bay/basin features are truly periglacial features (Custer 1986). For one thing, bay/basin features are found not only in New Jersey, where they may be found within 50 km of the Pleistocene ice front, but they are also found as far south as the South Carolina Coastal Plain where they are referred to as "Carolina Bays". It is very unlikely that these more southern features, which appear to be somewhat similar in morphology to the New Jersey features (Rasmussen 1958), were formed under periglacial conditions with frozen soil and ground water. Furthermore, in a comprehensive study of bay/basins features in central and southern Delaware, Rasmussen (1958) rejected the hypothesis that they had a periglacial origin. However, Rasmussen was unable to effectively explain their origin by other geomorphological processes.

The current research on bay/basins in the Route 13 Corridor provided data on both human utilization of bay/basin features and their geomorphology. The various data gathered on the bay/basin feature's geomorphology shows that their configuration has changed dramatically over the course of the Late Pleistocene and the Holocene. Sedimentary data from the bay/basin features studied do not support the hypothesis that these features have a periglacial origin. If anything, the bay/basin sediments are more similar to those seen in sinkhole settings from the northern Delaware area (Custer and Griffith 1984). Probably the most that

can be said at present is that bay/basin features are open water-filled depressions that were acting as sediment and pollen traps at least since the end of the Pleistocene and through the Holocene. The most important point is that, no matter what their origin, these features were sources of fresh water which were very attractive for the game animals hunted by the prehistoric inhabitants of the Delmarva Coastal Plain throughout the Holocene.

The Route 13 planning survey showed some interesting patterns in human utilization of these bay/basin features. Probably the most interesting observation to make concerns the extent to which these features were used. A total of 148 bay/basin features were studied by either surface reconnaissance or subsurface testing. Of these, 128 features (90%) had associated archaeological sites. Diagnostic artifacts were found at 49 of these sites. Of these 49 sites, 5 have Archaic components, 38 have Woodland I components, and 5 have Woodland II components.

It is important to note that no Paleo-Indian components were discovered in association with these features during the Route 13 survey. In contrast, Bonfiglio and Cresson (1978:18) note that of 94 bay/basin features, 7 (7%) contained fluted point components in the New Jersey sample. There is no general shortage of Paleo-Indian fluted point sites in the upper Delmarva Peninsula and quite often these sites are associated with poorly drained, swampy settings (Custer 1984a:48-60; 1984d; Custer, Cavallo and Stewart 1983; Custer, Catts, and Bachman 1982). However, the known fluted point sites of the Delmarva Coastal Plain are associated with freshwater interior swamps fringing drainages within the Mid-Peninsular Drainage Divide, not bay/basin features. There are several explanations of this difference in Paleo-Indian utilization of bay/basin features between the Delmarva and New Jersey Coastal Plain. A simple explanation may be that bay/basin features are not large enough during the late Pleistocene in the Delmarva to be attractive hunting locales. This explanation could easily be tested by obtaining a series of radiocarbon dates on bay/basin sediments in a variety of settings where there are associated archaeological sites of different ages. A second explanation may be based on sampling factors. Although the Delmarva sample is large in number and, due to its random component, less biased than the New Jersey data, the New Jersey data comes from a wider geographic area than does the Delmarva sample which is drawn from a smaller, If a sampling bias is involved, more concentrated area. additional survey of bay/basin features in other areas of the Delmarva Peninsula should reveal associated Paleo-Indian sites and should be an important part of future field reconnaissance surveys.

Assuming that there are no sampling errors and that bay/basin features are present in the Delmarva Peninsula throughout the Late Pleistocene and early Holocene, additional behaviorial explanations of the differences between the New

Jersey and Delmarva data are necessary. The Paleo-Indian utilization of bay/basin features in New Jersey may be due to the fact that the bay/basin features of the New Jersey High (or Inner) Coastal Plain are often associated with either the cuesta, or other concentrations of secondary lithic resources (Cavallo 1981; Marshall 1982:24,32). Custer, Cavallo, and Stewart (1983) and Gardner (1974; 1977) have noted the important role of lithic resource locations in Paleo-Indian settlement patterns and the juxtaposition of the lithic resources and game-attractive hunting locales may have made the New Jersey bay/basin settings very attractive settlement locations during Paleo-Indian times. similar juxtaposition of resources is seen in the Delmarva region (Custer and Galasso 1980; Custer 1984a:59) and this may be why there was little or no Paleo-Indian utilization of these features in Delaware. This explanation could be tested by looking for bay/basin locations in Delaware that may have hitherto unknown associated lithic sources. These features should have some signs of Paleo-Indian utilization if the above explanation is correct.

## Archaic Period

As was the case for the Paleo-Indian Period, Archaic Period sites are not common in the local archaeological record. Nonetheless, a recent study (Custer 1986) has shown that there is a definite expansion in the number of site location types during the Archaic Period. Because there are few Archaic sites known, the main research question suggested by the state plan is basic site recording and description within a problem-oriented format (Custer 1983:134-135). A site location model provides one problem orientation and Gardner's (1978) model, which stresses interior swamp locations as Archaic site foci is an example.

The planning survey of the northern study areas (Custer and Bachman 1986) identified Archaic Period bifurcate points from 8 sites, which nearly doubled the number of known Archaic sites from the Delaware High Coastal Plain. The planning survey of the southern study areas (Custer, Bachman, and Grettler 1986) added 15 more sites from the Low Coastal Plain, 13 of which contained bifurcated-base or Stanly/Neville points. Concentrations of bifurcates were also recorded from several sites, all of which were from the large Leitzinger/Chapman and Deneumoustier collections. Sites with multiple bifurcate finds which have been classed as possible habitation sites are listed in Table 5 along with possible procurement sites. One of these sites (7NC-J-9a) falls within the final alignment (Figure 7).

Many of the Archaic Period sites located in the planning surveys are associated with bay/basin features and this association provides a potential local research question. Utilization of bay/basin features in the study area seems to have begun early in the Holocene. There are five bay/basins associated with sites with bifurcate-base points, which are the only really reliable indicators of the Archaic Period (Custer 1984a:61-62). The presence of a Kirk-like point at one of these bay/basin sites may indicate that the utilization of these sites

TABLE 5

SAMPLE ARCHAIC PERIOD SITES FROM ROUTE 13 CORRIDOR

Possible Base Can	ps Possible Procurement Sites
7K-C-344 7K-C-86A 7K-C-86C 7K-C-90 7K-J-105	7K-C-211 7K-C-305 7K-D-46 7NC-H-39 7NC-G-56 7NC-J-117 7NC-H-60 7NC-J-99

began quite late in the Paleo-Indian Period. Generally, the sites seem to be small, ephemerally utilized hunting/processing sites. Five sites may not seem like a large number; however, prior to the Route 13 surveys, only 79 sites with bifurcate points were recorded for the Delmarva Peninsula (Custer 1986). Of these, only 12 were located in the High Coastal Plain and only 7 Archaic sites in the entire Delmarva Archaeological Data System including adjacent areas of southeastern Pennsylvania, are associated with bay/basin features. The Archaic bay/basin sites from the Route 13 surveys are, therefore, an important addition to the Archaic site data base, and testing of bay/basin locations during the Phase I survey of the final alignment is an important research activity.

Because the Archaic Period of Delmarva prehistory is so poorly known, it is difficult to assess the meaning of the Archaic bay/basin sites. However, some observations can be made. The beginning of bay/basin utilization seems to occur at the same time as a series of rather dramatic environmental changes. During the period from 8500-6000 B.C. there is evidence from numerous sites indicating dry climatic conditions (Custer 1984a:47-48; Custer and Griffith 1984; Carbone et al. 1982). Environments seem to have changed from a mosaic of grasslands, swamps, boreal forests, and deciduous forests to a closed boreal forest with fewer poorly drained settings in interior areas. However, local sea level rise affected coastal water tables and increased the incidence of swamps in these areas. The presence of wind-blown sediments (Foss et al. 1978) and evidence pronounced changes in stream channel morphology (Custer and Griffith 1984: Figure 5) also indicate potential dramatic changes in the patterns of surface water availability. The beginnings of bay/basin utilization may be related to these environmental changes. It is possible that changes in stream channel morphology altered the distribution of swampy settings in the Mid-Peninsular Drainage Divide, as evidenced at the Dill Farm Site (Custer and Griffith 1984), and caused late Paleo-Indian and Archaic groups to seek out new swampy hunting stations, such as the bay/basin features. Another factor which may have been

contributed to a shift to new procurement sites locations, including bay/basins, during the Archaic Period is the fact that during late Paleo-Indian and Archaic times the emphasis on high grade cryptocrystalline lithic materials seems to have disappeared (Custer 1984a:59-60). If association of bay/basins and lithic sources was no longer a critical factor in site selection, then the bay/basin sites of the study area may have become a more attractive settlement option. Once these bay/basin procurement sites became part of the settlement pattern in interior areas, their utilization continued into warm-wet climatic conditions of the post-6000 B.C. time period (Custer 1984a:62-64).

The Archaic sites associated with stream settings seem to be similar to others described for the Delmarva Coastal Plain (Wise 1983; Kavanagh 1979; Custer and Galasso 1983; Galasso 1983) and are primarily small procurement sites. These sites probably represent hunting and procurement sites which support other base camp sites. Some of the larger base camp sites have been tenatively identified elsewhere in Delaware (Custer 1984a:69-72); however, none were identified in these surveys. It may be possible that there are no large Archaic base camps in the Coastal Plain areas away from the large interior swamps. Some of the Archaic sites found in this survey may be small base camps rather than procurement sites and the present survey methods were unable to distinguish the differences between the two site types. Both Wise (1983) and Galasso (1983) have suggested that the Delaware Coastal Plain Archaic settlement pattern is characterized by small habitation and procurement sites and Kraft and Mounier (1982) note similar patterns in the New Jersey Careful survey and excavation techniques should Coastal Plain. be used in future studies so that accurate estimates of Archaic site size and settlement can be developed. Archaic sites may indeed all be small, but this impression may be a result of biased and incomplete samples.

### Woodland I Period

The state plan notes that the Woodland I Period is the best understood time period on the Delaware Coastal Plain (Custer 1983:135) and that it also has associated with it very diverse research questions. One of the major research questions involves the study of the processes by which local egalitarian societies were transformed into more complex ranked societies (Custer 1982; 1983:135) and the Route 13 study area transects the area where this transformation was most dramatic.

Woodland I Period sites comprise 56% of the 271 sites with identifiable components within the Route 13 Survey area and are the largest and most numerous sites of all time periods. All southern Delaware cultural complexes are represented and the survey data includes a large variety of tool types, lithic raw materials geomorphological settings, and site sizes. Woodland I sites are generally much larger than the preceding Paleo-Indian and Archaic Period sites and the surface collected artifact

assemblages exhibit a diversity of ceramic and lithic tool types, suggesting a broad range of activities took place. The largest sites are interpreted as macro-band base camps and are located primarily along the banks of the major streams. Smaller satellite sites are found at varying distances from the macro-band base camps and are thought to be micro-band base camps, procurement/staging sites, and procurement sites (Catts, Shaffer, and Custer 1986: Appendix III). The Route 13 survey has provided extensive data on Woodland I settlement patterns and intensive excavation of a series of both large and small sites should provide valuable information on this subject. The only site within the final alignment listed on the National Register (Carey Farm - 7K-D-3) is a Woodland I site.

A series of controlled comparisons among the macro-band base camps represents one method of studying and explaining the variety of site types present during the Woodland I Period. Similar methods are being used, with great success, in studying the emerging "formative" villages of Mesoamerica (Flannery 1976, 1982). Necessary prerequisites of such comparisons, however, are comparable classes of data. Therefore, an important research goal should be the examination of Woodland I macro-band base camps in order to develop comparable bodies of data on subsistence, house and storage features, technology, exchange, and social organization. Excavation of large areas at these sites is necessary for these studies in order to clearly delineate different functional areas, such as habitation areas, tool production areas, and storage and processing areas. Microband base camp and procurement sites should also be approached in a similar manner. Especially important are the macro-band base camp and procurement sites located in the vicinity of the microband base camps with the final alignment. Example Woodland I macro-band base camps in the Route 13 Corridor which would provide pertinent data on these questions are listed in Table 6 along with examples of micro-band and procurement sites.

TABLE 6	

7K-C-256

7K-C-86E

7K-C-247

MACRO-BAND 7NC-G-73 7K-A-11 7K-D-33 7NC-J-110	BASE CAMPS 7NC-G-11 7K-C-211 7K-C-338 7NC-H-39	7NC-H-78 7K-C-86A 7K-D-25 7K-C-249	7NC-J-31 7K-C-90 7K-C-255	7NC-J-32 7K-C-344 7K-C-267	7K-A-10 7K-D-73 7NC-J-105
MICRO-BAND 7NC-J-147 7NC-H-15	BASE CAMPS 7K-C-243 7NC-H-18	7K-C-87A	7K-C-299	7K-D-83	7NC-H-14
PROCUREMENT 7NC-G-51	r sites 7NC-G-75	7NC-H-54	7NC-J-84	7NC-J-112	7NC-J-160

SAMPLE WOODLAND I SITES FROM ROUTE 13 CORRIDOR

7K-D-82

7K-D-94

7NC-H-24

One of the most poorly understood, yet most provocative Woodland I cultural complexes is the Delmarva Adena complex, known from the spectacular mortuary/exchange centers at the Killens Pond, Frederica, and Saint Jones sites and a number of cache finds and isolated surface finds. Adena materials were surface collected at eight sites from the Route 13 Survey, including three sites from the Leitzinger/Chapman collection and in the single-site Deneumoustier collection. Sites 7K-C-94 (Dyke Branch) and 7K-D-8 and D-59 (Little River/Pipe Elm Branch) produced Adena bifaces and Coulbourn (ceramic-tempered) pottery, while 7K-D-33, 7K-D-69, and 7K-D-86 (Little River/Pipe Elm Branch) and 7K-C-344 (Hughes Crossing) yielded bifaces. D-86 contained a large medial section of an Adena biface manufactured from Flint Ridge (Ohio) chalcedony and Adena bifaces from the aforementioned 7K-D-69 were produced from the same material. In addition, 7K-C-230, on Alston Branch near Cheswold, produced a large utilized flake made from the same exotic raw Unfortunately, none of these sites could be materials. identified as to functional type.

It is unknown whether any of the Route 13 Corridor Delmarva Adena sites are equivalent to the mortuary/exchange centers of the Killens Pond, Frederica, and Saint Jones sites. But, even if they are not, they may prove instructive if they are habitation or procurement sites for the Adena culture. No single component Delmarva Adena macro-band base camps have ever been found (Custer 1984a:114) and none of the Route 13 Corridor sites appear to fall into that category. However, excavation of these kinds of smaller sites may produce valuable data on non-ideotechnic or non-sociotechnic Adena adaptation.

Besides Flint Ridge chalcedony, other exotic lithic materials are present in various site assemblages from the Route 13 survey. The use of steatite, argillite, rhyolite, and ironstone by prehistoric peoples has far-reaching implications for trade and exchange and group interaction in the Middle Atlantic region and these interactions seemed to reach their zenith during the Woodland I Period. All four of the above-named materials occur in the Route 13 survey and argillite is especially common from the Leipsic River south. A probable Woodland I site with large quantities of argillite and features was sampled at site 7K-C-255 on the south side of the Leipsic River. The Barker's Landing site on the lower Saint Jones River appears to be a large argillite reduction and processing center (Custer 1984a:109) and 7K-C-255 site could rival it in scope. Many more of these sites need to be studied in order to understand the behavior involved in the lithic exchange systems. Argillite was found at dozens of sites within the Route 13 Corridor and some of the most prominent are: 7NC-H-13, 7NC-H-39, 7K-C-211, 7K-D-69, 7K-C-338, and 7K-A-26. Although no large concentrations of rhyolite were encountered in the Route I3 Corridor, it is present at many sites, including 7NC-H-14, 7NC-J-105, 7K-D-69, 7K-C-291, 7K-C-338, and 7K-A-47. Ironstone bifaces and debitage were recorded from 7NC-J-103, 7K-C-118, 7K-C-125, 7K-C-211, 7K-C-236, 7K-D-33, 7K-C-313, 7NC-J-145, 7K-A-23, and

7K-A-61. Steatite was found in the Leitzinger/Chapman and Deneumoustier collections and at 7K-C-174 on Willis Branch in the Leipsic River drainage.

The Woodland I Period also coincides with certain poorly estood paleoclimatic changes. One of the hypothesized understood paleoclimatic changes. conditions is the so-called mid-postglacial xerothermic, or warm, dry period or periods occurring some time after 3000 B.C. These may have caused episodic, scattered vegetation denudation and redeposition of surface soils by aeolian transport as well as alterations in prehistoric pollen records. These landscape changes may have caused changes in the settlement/subsistence systems of prehistoric peoples which may be reflected in the archaeological record. Woodland I sites are abundant in the Route 13 Corridor and the survey presents an ideal opportunity to sample the prehistoric adaptation and associated paleoenvironments of a very large section of the Delaware Coastal Plain. Several sites found through the excavation of 1 x 1 meter test units, including 7NC-H-20, 7K-C-255, 7K-C-338, and 7K-F-143, have already been used as a basis for preliminary conclusions about conditions leading to aeolian soil transport (Custer and Bachman 1986; Ward and Bachman 1986). Other excavated sites from the Route 13 Corridor which have produced prehistoric materials in undisturbed contexts include 7NC-G-60, 7NC-G-62, 7NC-G-63, 7NC-J-27, and 7K-C-266. Geomorphologists, palynologists, pedologists and archaeologists working in concert would have an opportunity to test the above mentioned hypotheses and to make important regional predictions regarding eastern coastal plain adaptation by Woodland I peoples.

The study of bay/basin features is also important for the Woodland I Period because the time period of most intensive bay/basin utilization is the Woodland I Period. During the beginning portions of this time period, and possibly during later periods as well, the Delmarva Peninsula and Middle Atlantic region, in general, experienced the warmest and dryest climatic conditions of the entire Holocene (Custer 1984c). forests of the Archaic time period were replaced by open xeric oak-hickory woodlands and grasslands (Custer 1984a:89-91) and very dramatic changes in surface water availability occurred (Curry and Custer 1982). One of the major settlement pattern changes seen in the Coastal Plain area was the utilization of a wide variety of interior environmental settings on an ephemeral basis (Custer and Galasso 1983:12-14). The increase in bay/basin utilization during this time period may be part of this trend. The data from 7NC-H-20 indicate that in areas of multiple bay/basin clusters there may also be more permanent sites dating to the Woodland I Period.

Excavation of a sample of bay/basin sites over a wide area would provide extensive comparative data on the use of this type of setting through time and a test of the assumptions produced by the Blackbird bay/basin data. Example sites within the Route 13 Corridor which are closely associated with bay/basin features and which would yield data in good context are 7NC-H-20, 7NC-J-47,

7NC-J-54, 7NC-J-105, 7NC-H-39, 7NC-H-16, 7NC-H-17, 7NC-H-40, 7NC-J-93, 7NC-J-94, 7NC-J-95, 7NC-J-19, 7K-A-59, and 7K-C-132. These are sites of various sizes and tool assemblages and are a representative cross-section of bay/basin site settings throughout the Route 13 Corridor.

## Woodland II Period

Woodland II settlement patterns in central Delaware are a topic of some controversy noted in the state plan (Custer 1983:137). For many years, numerous authors have suggested that there is a relative absence of Woodland II sites in southern New Castle County and northern Kent County. By the same token, up until 1980 the nature of the northern New Castle Woodland II occupations were also very poorly defined. Nonetheless, the southern New Castle County and northern Kent County area was viewed as a "buffer zone" or "fever belt" (Withoft 1984) separating two distinctive ethnic groups. The original Route 13 planning study analyzed extant artifact collections and noted numerous Woodland II sites in the supposed "buffer zone" making the whole concept somewhat invalid (Custer et al. 1984:220-221). The "discovery" of these sites was due to the fact that previous analyses had not recognized the Woodland II Minguannan ceramics in the collections because the type was not defined in the literature prior to 1981 (Custer 1981).

The discovery of Woodland II sites in the northern survey area reveals a similar bias in previous studies which caused Woodland II sites to be under-represented in the data base (Custer and Bachman 1986). Most of the Woodland II sites in the northern survey area, and all of the sites with Minguannan pottery, were discovered during subsurface testing of wooded areas dividing plowed fields from bluffs along the major drainages. The sites are small and appear along most of the major stream headlands studied. Furthermore, they are almost all unplowed and would have been, and were, missed in previous studies which focused primarily on surface survey of cultivated fields. Thus, there really is no absence of Woodland II sites in the study area and there is no need to invent a "buffer zone".

It can be noted that Woodland II sites in the study area are generally smaller than the Woodland II sites found farther south on the Delmarva Peninsula (Custer 1984a:157-171; Custer and Griffith 1986). However, the Woodland II sites of the study area fall well within the range of site sizes seen among Woodland II sites of the Minguannan Complex (Custer 1984a:155-157; Stewart et al. 1986).

It is interesting to note that, there seems to be a large area in Kent County where the three major Woodland II ceramic types overlap. Shell-tempered Townsend ceramics were found at the Bailey Farm (7K-A-10, A-26 and A-27) on the south bank of Duck Creek and at other sites in the Smyrna study area and at two sites in the Leipsic drainage. Minguannan ceramics were recovered from excavated test units in the Double Run drainage

Minguannan and Slaughter Creek Complex boundaries far beyond their current limits, a prospect that would require verification by extensive subsurface testing. In addition, shell-and-grit-tempered Killens Ware sherds were found at various places between Smyrna and Magnolia. Radiocarbon dates on Slaughter Creek Complex Townsend Series ceramics range from A.D. 975 to 1370 (Custer 1984a:180-181) and no dates are available yet for Minguannan or Killens Ware ceramics. The physical extent of these ceramic types, their temporal placement, and cultural associations and/or juxtaposition are all questions which could be addressed by further data from the Route 13 Phase I and II survey. Example sites from the Route 13 Corridor which have produced a range of Woodland II ceramic types in good context include 7NC-G-62, 7NC-G-63, 7NC-J-47, 7K-A-10, 7K-A-26, 7K-A-27, 7K-A-74, 7K-C-195, the entire Leitzinger/Chapman collection (Custer, Bachman, and Grettler 1986: Appendix III), 7K-C-275, 7K-C-344, 7K-D-8, 7K-D-60, 7K-F-136, and 7K-F-137.

There seems to be little difference in site selection between Woodland I and II Period sites, except for the Woodland I emphasis upon bay/basin features in the Blackbird area. This implies that there was no Woodland II shift to agriculturally more productive soils and that the Woodland I intensive hunting/gathering subsistence pattern was continued into the Woodland II Period. Example Woodland II sites within the Route 13 Corridor which would yield good data on settlement patterns are listed in Table 7.

TABLE 7										
SAMPLE WOODLAND	тт	SITES	FROM	THE	ROUTE	13	CORRIDOR			

7NC-G-59	7NC-G-60	7NC-G-62	7NC-G-63	7NC-G-64	7NC-G-79
7NC-G-81	7NC-G-82	7NC-J-32	7NC-J-47	7NC-J-54	7NC-J-69
7NC-J-71	7NC-G-99	7K-A-10	7K-C-211	7K-C-249	7K-C-87A
7K-D-21	7K-C-344	7K-C-322	7K-D-60	7K-C-329	

#### Contact Period

Only one verified Contact Period site has ever been identified in Delaware and it is located outside of the Route 13 Corridor. Site 7NC-E-42 is situated on the White Clay Creek near Churchman's Marsh at Stanton, Delaware (Custer and Watson 1985). No suspected sites of this Period were found during the Route 13 surveys and any site found during future surveys would have the highest research value.

In conclusion, the Route 13 Corridor Planning Surveys have provided the opportunity to sample extensive areas of the Delaware Coastal Plain and gather data about all five of the major periods of Delaware prehistory. Existing models of

prehistoric adaptations appear to be not radically contradicted by the data collected from the 1984 and 1985 Route 13 surveys. At the same time, some alterations of the models may be necessitated by the data, while many new avenues of research have been opened. It is expected that the Phase I and II Route 13 archaeological survey will provide much new data to these ends.

## HISTORIC ARCHAEOLOGICAL RESOURCES

The following discussion of historic archaeological resources consists of two parts: a brief summary of the local history and a discussion of regional research issues and the classes of historic archaeological sites which are most likely to contribute data pertinent to these research questions.

## REGIONAL HISTORY

This overview is abstracted from Munroe (1978, 1984), Hoffecker (1973, 1977), Weslager (1961, 1967), Lemon (1972), Hancock (1932, 1947, 1976), Hudson (1969), Scharf (1888), and Bausman (1940, 1941).

The earliest colonial settlement in Delaware known as Swanendael ("valley of swans") was made at present Lewes in 1631 under the sponsorship of patroons of the Dutch West India Company for the purpose of whaling and raising grain and tobacco. This venture was privately financed, but it ended in tragedy because the all-male population was wiped out by the local Indians in a massacre in 1632. Farther north a group of Swedes in the employ of the New Sweden Company built Fort Christina in 1638 in what is now part of the present city of Wilmington establishing the first permanent European settlement in Delaware. The Swedish government supported the venture, and Fort Christina became the nucleus of a scattered settlement of Swedish and Finnish farmers known as New Sweden. Within a few years this Swedish settlement included a fort, church and small farming community.

The Dutch claimed the identical land — from the Schuylkill River south — by right of prior discovery, and in 1651 the West India Company retaliated by building Fort Casimir at New Castle in an attempt to block Swedish efforts to control commerce in the Delaware River. The Swedes captured this fort in 1654 and renamed it Fort Trinity. Rivalry between Swedes and Dutch continued, and the Dutch recaptured Fort Trinity in 1655, and also seized Fort Christina. As a result New Sweden went out of existence as a political entity due to lack of support from the homeland although the Swedish families continued to observe their own customs and religion.

In 1657 as a result of peaceful negotiations the City of Amsterdam acquired Fort Casimir from the West India Company, and founded a town in the environs of the fort called New Amstel. This was a unique situation in American colonial history — a European city became responsible for the governance of an

American colony. A small fort was also erected at Lewes in 1659 for the purpose of Blocking English intrusion, and a few settlers built homes there including 41 Dutch Mennonites who established a semi-socialistic community in July of 1663. They, too, were under the supervision of local officials appointed by the burgomasters of Amsterdam.

English hegemony of the region began in 1664 when Sir Robert Carr attacked the Dutch settlement at New Amstel on behalf of James Stuart, Duke of York, brother to Charles II. This was an important move on England's part to secure her economic position in the New World. New Amstel, renamed New Castle, was besieged and sacked by English soldiers and sailors resulting in the deaths of three Dutch soldiers and the wounding of ten others. English troops plundered the town, and English officers confiscated property, livestock, and supplies belonging to the City of Amsterdam, as well as the personal property and real estate owned by the local Dutch officials. The homes of the Mennonites and other settlers at Lewes were also pillaged.

A transfer of political authority from Dutch to English then followed, and the Dutch settlers who swore allegiance to the English were allowed to retain their lands and personal properties with all the rights of Englishmen. Former Dutch magistrates continued in office under English authority, and Swedes, Finns, and Dutch alike peacefully accepted the rule of the Duke of York through his appointed governors.

In 1671 the Duke of York made the first land grants in the area of present Kent County. By 1679, 53 grants had been made. With water transportation the major mode of travel and commerce in the late seventeenth century, most of the lands granted in Delaware had frontage on a navigable stream or waterway. This was especially true for present day Kent County. Twenty-one of the 53 grants made by 1679 in Kent County were along the St. Jones River.

Overland travel was extremely difficult in the region throughout the seventeenth and eighteenth centuries with heavily wooded and marshy areas constituting major obstacles. The sparseness of the population and corresponding lack of accommodations for travelers added to the discomfort and dangers of overland transportation. In 1680 people living in the upper part of Kent County, then part of Whorekill County, petitioned Governor Andros to create a new, smaller county and thus relieve them of traveling to Lewes. Sixty-five settlers living between Blackbird and Cedar Creeks signed the petition, but believed that 100 "tithabel" persons would be affected. Governor Andros granted the petition in 1680 and established the northern boundry of the new county, St. Jones County, at Duck Creek and the southern boundary at Cedar Creek.

In 1682, William Penn was granted proprietary rights over Pennsylvania and the Lower Three Counties which included all of modern Delaware. Relations with Pennsylvania deteriorated and relative autonomy for the Three Lower Counties, including a separate assembly, was established by 1701. Economic ties, however, continued to link Penn's factionalized colony.

Boundary conflicts soon developed in St. Jones County, renamed Kent by 1683. The border with New Castle County was Duck (Smyrna) Creek, but as the creek did not extend very far to the west, the western part of the boundary was left undefined. Even more significant were rival claims by the Calverts in Maryland. The Delaware-Maryland border, particularly along northern Kent County, was hotly disputed until it was permanently fixed in 1765. Specific efforts by both Penn and Calvert to establish settlements along the disputed boundary provides an excellent example of the influence of proprietary decisions and endemic boundary disputes in determining historic settlement patterns.

Waterways were important to transportation and commerce as early roads were limited in number and of poor condition. few existing roads led to landings on rivers and the Delaware Bay where produce and goods were shipped by cheaper, and more efficient, water transport. The Delaware River - Delaware Bay served as a major focus of water transportation because the majority of Delaware's streams flow eastward to these bodies. For this reason the large port city of Philadelphia, and to a lesser extent Wilmington and New Castle, exerted major commercial influence on the Delaware counties throughout the eighteenth century and later. Wilmington, New Castle, and Lewes were also ports for ocean-going vessels involved in export trade. Overland transport was limited to a few major roads, such as the eighteenth century post road connecting Philadelphia-Wilmington-New Castle-Odessa-Middletown-Dover-Lewes with a western branch at Milford linking it to the Chesapeake Bay. Small secondary roads and paths interconnected numerous villages and hamlets and were relatively common within the study area.

One reason for the relatively slow growth of Kent County beyond the St. Jones River drainage was a lack of any extensive network of navigable streams or good roads in the western part of the study area. Land north and west of the navigable portions of Duck, St. Jones, Little and Murderkill Creeks, were more sparsely populated than other areas in Kent County because of the importance of water transportation in the cheap movement of bulky agricultural products. In an attempt to improve the roads in the Lower Counties, the General Assembly in 1752 and again in 1761 called for the construction of a "King's Road" between the New Castle-Kent County border and This road was to be 40 feet wide with all but ten feet cleared. Secondary roads of 30 feet in width and all but ten feet cleared were also to be constructed. From Salisbury along the New Castle-Kent County border, the post road continued south through Dover, Camden, Milford and Frederica, eventually to reach Lewes and the Maryland border (Laws of the State of Delaware 1797:320, 390-394).

By the middle of the eighteenth century population increases and commercial expansion stimulated the growth of towns and the development of transportation and industry. Dover and Smyrna quietly emerged as the two largest towns in Kent County, with markets, landings and central locations attracting new settlers. Lebanon, Camden, Milford and Frederica were also established communities by this time. The population of Kent County in the study area grew through both natural increase and the continued movement of new peoples into the area from Maryland, pennsylvania, the other two counties of Delaware, and from Europe, particularly Great Britain. A census taken privately in 1760 gave the population of Kent County as 7,000 individuals (Conrad 1908:580).

The median size of land warrants granted in 1735 in Kent and New Castle counties was between 200 and 300 acres, with the typical grant close to 200 acres (Penna. Archives 1891: 193-202). Larger grants, however, were not uncommon. This trend towards smaller average holdings as compared to seventeenth century grants was due to a tendency for large grants and tracts to be divided and subdivided by sale and inheritance. If New Castle County and southeastern Pennsylavania can be used as a rough comparison, the density of rural settlement in northern Kent County was approximately 5 households per square mile (Ball 1976:628). For more poorly drained parts of the study area, particularly those along upland swamps, this density is expected to have been lower.

The general rise in land prices in Delaware in the late eighteenth century reflected the development of larger regional and extra-regional markets for Delaware agricultural products, particularly wheat. The development of larger markets in turn spurred the growth of established urban areas, most notably Wilmington, and the establishment of smaller cities and towns throughout the agriculturally productive areas of the state. In the study area, Middletown, Salisbury (Duck Creek Crossroads), Noxontown, and Dover were established trade and service centers along the Dover-Lewes post road by the mid-eighteenth century. The profitability of wheat accelerated a trend towards large-scale, market-oriented small grain agriculture already well established in Kent and New Castle counties.

Throughout the late eighteenth and nineteenth centuries, the agrarian Delmarva peninsula was considered an area of production and transshipment between the Chesapeake Bay markets (Annapolis and Baltimore) and the Delaware River and Bay markets (Philadelphia and New York). As local markets prospered, so too did the hamlets and other unplanned towns that had sprung up at crossroads and around taverns, mills and landings. One such crossroad community in the study area was Seven Hickories, a stop along the Kenton to Dover road. Important landings included the Brick Store, Hay Point and Short landings along the Smyrna River; Dona, Naudain and White Hall landings along the Leipsic River; and Lebanon, Forest, and White House landings along the St. Jones. Landings, as well as towns and hamlets in the study area,

formed, grew and sometimes declined according local and regional economic conditions.

Mills were an important part of the economy and an extensive network of mills throughout the state were established during the eighteenth and nineteenth centuries. Millworks in the agrarian areas were frequently multi-functional with water-powered grist, saw, and cloth fulling operations being performed at different seasons at the same location. The mills primarily produced goods for local markets. A number of such mills are located in the study area. The Blackbird, Leipsic, and Wyoming areas in particular contain a number of significant mill sites.

Throughout Delaware's agricultural history farm labor has been a valued commodity. In the colonial period blacks in slavery and white indentured servants were the primary farm laborers. By the mid-eighteenth century, white indentured servants were as numerous as black slaves. Slightly less than one-half of the blacks in the state in 1790 were free; however, by 1810, less than one-quarter of blacks were slaves according to federal censuses. Free black labor played an increasing role in farm production in Delaware as ethical and economic factors reduced the profitability of slavery prior to the Civil War. After Emancipation, black labor continued be a significant factor in farm production.

According to the 1810 national census, the population of Kent County was 20,495 persons. Marginal farm lands were being increasingly settled as good, well-drained lands with access to markets were becoming more scarce. The move inland from navigable waterways apparent by the late eighteenth century began with the influx of new populations, particularly from England. This period of growth from the late eighteenth to early nineteenth centuries, however, was short lived with the population of Kent County actually decreasing in the late 1810s to the 1830s. By 1840 the population of Kent County, according to the national census, had declined to 19,872 persons. Given the natural increase of the people that remained in Kent County during this period, the number of people leaving and "passing through" the County is even greater.

The movement of large numbers of Delawareans in the early nineteenth century was caused in part by the sharp decrease in demand for Delaware agricultural products following the end of the War of 1812 and the Napoleonic Wars. Both conflicts had created an inflated market for American agricultural products, particularly wheat and other cereal crops. Other areas of the country were equally hard hit, with the nation faced with serious economic difficulties by 1819.

The rapid population growth of the first decades of the nineteenth century in Delaware also forced many farmers off the land. Competition for prime land forced many new farmers to clear and till land of poor or marginal quality. Many of these farmers were then hard pressed to turn a profit from their

farmsteads and thus became part of the outward migration from Delaware.

Corresponding to the decline in wheat prices and increased competition for good land was a significant decrease in the fertility of agricultural lands throughout the state. Poor farming methods, erosion, and simply exhausted land contributed to the economic woes of Delaware farmers. Increased opportunities in urban areas and the West also served to draw people from Delaware, and Kent County in particular. As more and more people left Delaware, the resulting labor shortage made the cultivation of marginal and exhausted lands even less profitable. This in turn influenced the movement of even more people away from Kent County. Poorly drained areas in the study area west of Dover were particularly affected.

The economic crises of the first decades of the nineteenth century helped to spur the beginning of an agricultural revolution throughout Delaware. The first agricultural improvement society in Kent County was formed in 1835. In 1836 the General Assembly authorized the first state geological survey under James C. Booth to analyze soils, locate sources of fertilizers, and advise farmers throughout the state. A number of factors worked in conjunction to establish Kent County, and Delaware as a whole, as an important agricultural producer. The discovery of marl, a natural fertilizer, during the construction of the Chesapeake and Delaware Canal in the 1820s enhanced the productivity of Delaware agriculture.

The opening of the canal in 1829 further encouraged the production of market-oriented crops by providing for the more efficient transportation of perishable goods. The opening of the Philadelphia, Wilmington and Baltimore Railroad in 1839 complemented existing water-based transportation systems and provided transportation of northern Delaware produce to the growing eastern markets. The extensive production of market-bound crops developed later in Kent and Sussex Counties due to a lack of interior transportation facilities, although produce did move by water from seaport towns. When the Delaware Line extended rail service to Dover and later Seaford in the 1850s, a vast agricultural hinterland was opened and agricultural production for markets increased significantly.

Prior to 1832 Delaware's agricultural products were primarily grains, with fruit and vegetable crops of lesser importance. Farming in the northern counties of Delaware was on a mixed system with cereal crops, fodder, livestock, fruits and vegetables produced for immediate consumption with surpluses sold in both local and regional markets. In this system, a portion of the farm was kept in permanent pasture while the remainder was cropped in a rotation of corn, oats, barley, wheat and clover. Livestock included cattle, swine, and draft animals with dairy products and livestock continuing to be a major farm occupation well into the nineteenth century. Lumber, flaxseed, hemp, and tobacco were also produced. Extensive rather than intensive use

of the land prevailed, presumably as a consequence of the emphasis on wheat exports and the general prosperity of most farms.

From the 1830s to the 1870s Delaware was the center for peach production in the eastern United States. Rich soil, favorable climate and rainfall, excellent transportation facilities, and strategic location near large markets made peach production a lucrative enterprise. Delaware City with its canal location led Delaware and New Castle County in production until the 1850s. The peach industry was hindered in Kent and Sussex counties until the 1850s due to transportation limitations. Early attempts there failed because producers could not move fruit to market economically. Rail service into the area and the absence of the peach blight in the southern counties made peaches profitable into the 1870s.

By the end of the "peach boom," massive harvests were being shipped by rail and steamship lines to New York where much was readied for resale to the northern states. The spread of a disease known as the "Yellows" devastated orchards throughout the state and brought an end to the boom. However, until the peach blight curtailed production, the peach industry proved profitable for a large number of peach growers, as well as a variety of support industries. Basket factories, canneries, and peach tree nurseries all aided in and reaped the financial rewards of the peach industry. Two components of the Smyrna study area, Smyrna Landing and the Brick Store (N-135) were heavily involved in the peach trade and included landing, cannery, evaporator, warehouse, and light manufacturing activities.

After the peach boom, other orchard and truck crops, particularly tomatoes, were important in the Smyrna area. The railroad and steamship lines integral to peach distribution, depended on peach shipment for a large portion of their annual revenue. One especially well preserved "peach house" is located within the proposed Route 13 Corridor. This standing structure, N-133, is in the Smyrna study area and represents one aspect of a larger trend in Delaware history towards the large-scale production of perishable crops for nearby urban markets.

Throughout the nineteenth century, and into the twentieth, agriculture in Delaware continued to focus on perishable products with a decrease in staples. More diverse crops, including tomatoes, apples, potatoes, and truck produce became more common in response to the demands of markets in New York, Philadelphia, Baltimore, and other cities. The number of acres cultivated in Kent County rose from approximately 283,000 acres in 1850 to 338,000 acres by 1900. Poultry and dairy production also increased significantly in this period in Delaware, particularly in Kent and Sussex counties.

Concurrent with the rise in importance of truck crops and dairy products in the late nineteenth century was the improvement of transportation throughout the state. The completion of the

Delaware Railroad trunkline through to Seaford in 1856 encouraged. the production of such goods by providing quick and cheap access to regional markets. Prior to the Delaware Railroad, steamboats and other water craft provided areas of Kent County with cheap and efficient transportation. One of the study areas, Smyrna Landing, was an important landing and warehouse district well into the twentieth century.

The Delaware Railroad spurred the growth of numerous towns along its route. Kenton, Cheswold [Moorton], Camden, and Wyoming prospered as the railroad expanded the mercantile and service functions these areas had previously performed. By 1900 Camden was the largest of these towns with a population of 536 people.

Tenant farming, which had been common in the eighteenth century, became even more prevalent in the nineteenth century. Large land owners, having acquired much of their holdings during the hard times of the 1820s and 1830s, leased their land to tenants. Most of the land owners and tenants were white, although a number of tenants and farm laborers, particluarly in Kent and Sussex counties were black. By 1900 over 50% of all farmers in Delaware were tenants or share croppers. Sites associated with agricultural tenancy comprise a significant number of the historic archaeological and standing structure resources identified along the southern Route 13 Corridor. Tenancy remained a dominant farming practice into the twentieth century, with almost 50% of the farmers in Kent County tenants in 1925.

The agricultural trends identified in the late nineteenth century continued relatively unchanged well into the twentieth century. Corn and wheat declined in importance due to competition from the western states. By 1880 alfalfa, legumes, and truck crops were increasing in importance and by the mid-twentieth century, had become more profitable than wheat. Dover was still the largest city in Kent County, although smaller than Wilmington and Newark. Smyrna, Leipsic, Little Creek and other towns in the eastern part of Kent County also expanded slightly during this period.

The late nineteenth and early twentieth centuries also saw the increasing commercialization of southern New Castle and Kent counties. Light manufacturing, including carriage making and cabinet making, and foodstuff processing, including canning and juice/syrup production, became an important part of the Delaware economy. Smyrna and Dover were the sites of most of this commercial and manufacturing activity, although other areas including Camden-Wyoming and Frederica were involved. The International Latex Corporation, established near Dover in 1939, was the first large manufacturer not utilizing local raw materials to locate in Kent County. Since World War II, other manufacturers, including General Foods and Scott Paper, have located in the county and together represent a significant addition to the economy of the study area.

The late nineteenth century also saw the continued growth of different ethnic communities in Kent County, particularly of Amish and Mennonites in the area west of Dover and of "Moors" in the Cheswold area. A number of prosperous Amish and Mennonite farms still exist in the study area near Fork Branch. The "Moors" of Delaware are a group of people who claim a common descent from a number of Black, Indian, and European ancestors. Until the early twentieth century, the Moors maintained their own schools and in World War I and II insisted on being listed as a separate race. As with the Amish and Mennonites, the Moor community exists today.

The patterning and density of settlement in Delaware, and the study area specifically, have been strongly influenced by several factors throughout its history: 1) an agrarain economy; 2) the commodity demands of large markets, first Europe and the West Indies, and later domestic commercial-industrial centers, and 3) transportation facilities. The completion of the Dupont Highway in 1923 linked the northern and southern sections of the state and helped to complete the shift in agricultural production towards non-local markets and open new areas to productive agriculture. Improved transportation in the twentieth century also brought a decline in the importance of the many small crossroad and "corner" communities that had sprung up in the late eighteenth and nineteenth centuries.

## RESEARCH OUESTIONS AND SITE SIGNIFICANCE

With regard to historic research, the large size of the Route 13 Relief Route Planning Corridor allows for the development and testing of a number of research questions within historical archaeology and geography, American history and material culture studies. The geographical and archaeological data generated by further work in the Route 13 Corridor would also provide useful information for the study of more traditional paradigms in the historical analysis of Delaware and the Chesapeake region (Tate and Ammerman 1979:43-45; Earle 1975:7; Wesler 1982:65).

The following research questions and topics are designed to integrate the interdisciplinary use of all archival, historic, architectural, and archaeological resources within a general research design that can be coordinated with all the different phases of an eventual data recovery program. These questions are not theoretical or explanatory in themselves, but rather encompass numerous issues of anthropological and historical significance and are broad enough in scope to be applicable to many kinds of sites. In addition, as all of these research questions have been either directly or indirectly addressed by previous historical and archaeological research, these research directions are designed to complement, rather than replace, these existing data bases.

Included with each research question is a list of specific archaeological sites from within the Corridor that could yield

relevant data. These sites are identified and located in other studies of the Route 13 Corridor (Custer, Jehle, Klatka and Eveleigh 1984; Custer and Bachman 1986; Custer, Bachman, and Grettler 1986) and further information on each site can be found in these studies. Table 8 gives the total number of sites in the Corridor by function and time period and also notes the sites within the final alignment by these categories. The relationship between potential research questions and types of historic sites is given in Tables 9-26. Tables 9-26 indicate what types of historic sites are likely to yield data relevant to specific The relative "quality" or applicability of research questions. data likely to be recovered at different levels of investigation is expressed according to a scale of high (H), medium-high (M-H), medium-low (M-L) and low (L). It can be noted that most of the known sites in the final alignment are agriculturally related dwelling complexes.

For the purposes of this research design, "significant" sites are those likely to produce data relevant to current historical, geographical, archaeological, and architectural research questions and goals. This definition of significance is in keeping with guidelines established by the National Register of Historic Places (King, Hickman, and Berg 1977) and accepted professional standards (Raab and Klinger 1977; Miller 1980). In addition, Tables 9-26 are subjective models of significance and attempt to include as many historic sites within the Corridor as possible within specific classes of research questions.

Two general levels of investigation, Phase I/II and Phase III, are used in Tables 9-26. These levels were created to differentiate between primarily locational and background data versus more extensive, site-specific data recovery operations. The first general level, Phase I/II, assumes primarily locational and background data about a site and a limited amount of subsurface testing. Such testing would be primarily to determine preservation and eligibility for National Register listing. The second general level, Phase III, assumes more intensive data about a site and more extensive archaeological testing, including complete data recovery. These levels are organizational rather than explanatory and should be interpreted as such.

Site function is a grouping by function of the 49 historic site types identified by previous studies (Custer, Jehle, Klatka, and Eveleigh 1984; Custer and Bachman 1986; Custer, Bachman, and Grettler 1986) and is consistent with guidelines established by the Delaware Bureau of Archaeology and Historic Preservation (Del Sordo and Guerrant 1985). Table 8 includes a breakdown of each major site function group. The time periods used in Table 8 and Tables 9-26 are based upon suggestions from the BAHP and reflect general trends within the political, social, and economic history of Delaware (Del Sordo and Guerrant 1985). Again, these temporal units are organizational rather than explanatory and should be interpreted accordingly.

TABLE 8

NUMBER OF HISTORIC SITES BY SITE FUNCTION AND TEMPORAL UNIT

FOR THE ENTIRE ROUTE 13 CORRIDOR

	AGCX	agten i	WCX MLL	CX COM	IM INC	TEN CH	R/SCH !	TRNSP
1910-x	30(3)	10(3)	109(38)	4(0)	9 (7)	3(0)	5(2)	5(1)
1820-1910	720 (111)	388(43)	265(63)	20(2)	68(26)	22(4)	48 (28)	18(4)
1760-1820	40(7)	2(2)	27(17)	17(2)	16(1)	1(1)	11(1)	2(0)
1720-1760	20(4)	0(0)	9(3)	1(0)	0(0)	0(0)	0(0)	0(0)
1680-1720	2(2)	0(0)	1(0)	0(0)	0(0)	0(0)	3(1)	0(0)
1630-1680	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
Unknown	19(6)	1(1)	44(18)	1(1)	2(0)	0(0)	6(5)	4(4)

AGCX: AGCX, AGBLG, PLANT, ESTATE, PEACH, PEAORC

AGTEN: AGTEN, TENANT, SLAVQ, MWHSE

DWCX: DWCX, DW

MLLCX: SMCX, SOMCX, GMCX, AGMCX, MMCX, SOMCX

COMM: COMM, MANUFY, WARE, LANDOP, RT, BANK, LMKILN, WKSH, STO, TAV, HOT, PHYS, BSSH

INDTEN: INDTEN, WKDW

CURR/SCH: CHUR, SCH, CEM, GOVBLG, PO

TRNSP: SCOSTA, SERVST, RR, RRR, RRSTA, BRID, CAUWY, CCBLG, LTHSE, VESSEL

( ): SITE COUNTS FOR FINAL ALIGNMENT

TABLE 9

DATA QUALITY BY SITE FUNCTION FOR SETTLEMENT PATTERN
AND LOCATIONAL STUDIES FOR 1630-1680

Cattlement	AGCX	AGTEN	DWCX	MLLCX	COMM	INDTEN	CHR/SCH	TRNSP
Settlement Patterns				•				
I/II: III:	Н М-Н	H H-M	Н М-Н	Н М-Н	Н <b>М-</b> Н	<b>н</b> н-м	H M—H	Н М-Н
111.	11 11	** **		•		<del></del>		
Frontier Development								
1/11:	茁	Н	H	H	Ħ	H	H	Ħ
III:	H	H	H	H	H	Ħ	H	H
Farmstead & Houselot Design								
1/11:	Ħ	н	H	M-H	M	H	M-L	M-H
III:	Н	H	H	H	М	н	M-L	M-H

## TABLE 10

# DATA QUALITY BY SITE FUNCTION FOR SETTLEMENT PATTERN AND LOCATIONAL STUDIES FOR 1680-1720

Settlement Patterns	AGCX	AGTEN	DWCX	MLLCX	COMM	INDTEN	CHR/SCH	TRNSP
I/II: III:	Н М-Н	H M-H	<b>н-н</b>	H M-H	<b>м-</b> н	M-H	H M-H	н- <b>м</b>
Frontier Development								
I/II: III:	H H	H	H H	H H	H	H	H H	H H
Farmstead & Houselot Design								
I/II: III:	H	H	H H	М-Н Н	М-Н М-Н	H	M-L M-L	М-Н М-Н

TABLE 11

DATA QUALITY BY SITE FUNCTION FOR SETTLEMENT PATTERN
AND LOCATIONAL STUDIES FOR 1720-1760

Settlement	AGCX	AGTEN	DWCX	MLLCX	COMM	Indten	CHR/SCH	TRNSP
Patterns								
I/II:	H	н	Ħ	H	H	H	H	н
III:	M-H	М-Н	M-H	M-H	M-H	M-H	M-H	M-H
Frontier Development								
I/II:	H	Н	H H	H	H H	Ħ	H	H H
III:	Ħ	H	н	Н	H	н	п	п
Farmstead & Houselot Design								
I/II:	H	Ħ	H	М-Н	M	Н	Î.	M
III:	H	H	Н	Ħ	M	H	L	М

TABLE 12

# DATA QUALITY BY SITE FUNCTION FOR SETTLEMENT PATTERN AND LOCATIONAL STUDIES FOR 1760-1820

	AGCX	AGTEN	DWCX	MLLCX	COMM	INDTEN	CHR/SCH	TRNSP
Settlement Patterns	•							
I/II:	H	н	Ħ	H	H	H	Н	H
III:	M-H	M-H	M-H	мн	M-H	M-H	M-H	H-M
Frontier Development								
1/11:	M-H	M-H	M-H	м-н	M-H	M-H	M-H	M-H
III:	M	M	M	M	М	M	M	M-H
Farmstead & Houselot Design								
I/II:	H	Н	H	M – H	M	Ħ	L	M-L
III:	H	H	H	M-H	M-L	Ħ	L	M-L

TABLE 13

DATA QUALITY BY SITE FUNCTION FOR SETTLEMENT PATTERN AND LOCATIONAL STUDIES FOR 1820-1910

	AGCX	AGTEN	DWCX	MLLCX	COMM	INDTEN	CHR/SCH	TRNSP
Settlement Patterns								
I/II:	珀	Н	H	Н	H M	H	H	H M
III:	M	М	М	M	М	М	М	M
Frontier Development								
1/11:	L	L L	L L	L	L L	L L	L L	L
III:	L	L	L	L	L	L	L	L
Farmstead & Houselot Design								
1/11:	Ħ	н	н	м-н	M-L	H	L	M-L
III:	H	Н	H	M-H	M-L	H	L	M-L

TABLE 14

## DATA QUALITY BY SITE FUNCTION FOR SETTLEMENT PATTERN AND LOCATIONAL STUDIES FOR 1910-PRESENT

	AGCX	AGTEN	DWCX	MLLCX	COMM	INDTEN	CHR/SCH	TRNSP
Settlement Patterns								
I/II:	Ħ	H	H	н	H	н	H	H
III:	M-L	M-L	M-L	M-L	M-L	M-L	M-L	M-L
Frontier Development								
I/II:	L	L L	L L	L L	L L	L L	L L	Ē
III:	L	L	L	L	L	. <b>L</b>	L	L
Farmstead & Houselot Design								
1/11:	H	M-H	H	M-H	M-H	Ħ	L	L
III:	H	M-H	H	H	H	H	L	L

TABLE 15

DATA QUALITY BY SITE PUNCTION FOR ECONOMIC, COMMUNITY,
AND TRANSPORTATION STUDIES FOR 1630-1680

	AGCX	AGTEN	DWCX	MLLCX	COMM	INDTEN	CHR/SCH	TRNSP
Agricultura History	1							
I/II:	H	H	м-н	H	м-н	M-L	M-L	H
III:	H	H	M-H	H	м-н	$M-\Gamma$	M-L	H
Commercial Industrial History	&							
I/II:	Ħ	H	M	Н	H	н	М	Ħ
III:	H	H	м-н	Н	H	н	M-L	Ħ
Tenancy								
I/II:	Ħ	H	M	м-н	M-H	H	М	M-H
III:	н	H	м-н	M-H	M-H	H	M-L	M-H
Subsistence Foodways	: &							
1/11:	H	Н	Н	M-H	Н	Ħ	M-L	M-H
III:	н	H	Н	м-н	H	н	M-L	M-L
Community Studies								
1/11:	H	H	Н	H	H	н	н	H
III:	H	H	H	H	H	H	H	Ħ
Transportat History	ion							
1/11:	м-н	M-H	м-н	H	H	м-н	M-H	H
III:	М	M	M	H	H	M	M-H	Ħ

TABLE 16

DATA QUALITY BY SITE FUNCTION FOR ECONOMIC, COMMUNITY,
AND TRANSPORTATION STUDIES FOR 1680-1720

	AGCX	agten	DWCX	MLLCX	COMM	INDTEN	CHR/SCH	TRNSP
Agricultura History	1							
I/II:	Ħ	H	м-н	H	M-H	M-L	M-L	H
III:	H	Ħ	M-H	H	M-H	M-L	M-L	H
Commercial Industrial History	<b>&amp;</b>							
I/II:	H	Н	M	H	H	H	М	H
III:	H	Н	M-H	H	H	Ħ	М	H
Tenancy								
I/II:	Ħ	H	M	м-н	M	H	M-L	м-н
III:	H	н	M-H	M-H	M	н	M-L	M-H
Subsistence Foodways	. &							
1/11:	Ħ	H.	Ħ	м-н	Н	Н	M-L	M-H
III:	Ħ	Н	H	м-н	H	H	M-L	M-H
Community Studies				•				
1/11:	H	н	н	H	Н	H	H	H
III:	M	М	H	H	H	H	H	H
Transportat History	ion							
I/II:	м-н	W-H	M-H	H	H	M-H	м-н	Ħ
III:	м-н	м-н	м-н	н	H	M	м-н	H

TABLE 17

DATA QUALITY BY SITE FUNCTION FOR ECONOMIC, COMMUNITY,
AND TRANSPORTATION STUDIES FOR 1720-1760

	AGCX	AGTEN	DWCX	MLLCX	COMM	INDTEN	CHR/SCH 1	rnsp
Agricultura History	1							
I/II:	H	H	M-H	H	M-H	M-L	M-L	H
III:	H	Н	M-H	H	M-H	M-L	M-L	H
Commercial Industrial History	&							
I/II:	Ħ	H	M	H	H	H	M-L	H
III:	H	H	M	H	H	Н	M-L	H
Tenancy								
I/II:	H	Н	М	M-H	М	Н	M-L	м-н
III:	H	Н	M-H	М-Н	М	H	M-L	М-Н
Subsistence Foodways	<b>&amp;</b>							
I/II:	Ħ	H	Н	м-н	н	H	M-L	M-H
III:	Н	H	Н	м-н	Н	H	M-L	M-H
Community Studies								
I/II:	H	H	H	H	Н	H	H	H
III:	M-H	м-н	м-н	<b>M-</b> H	M-H	м-н	Н-М	H
Transporta History	tion							
1/11:	м-н	M-H	M-H	H	H	м-н	M-H	H
III:	M	М	M	H	H	M	M-H	H

TABLE 18

DATA QUALITY BY SITE FUNCTION FOR ECONOMIC, COMMUNITY,
AND TRANSPORTATION STUDIES FOR 1760-1820

	AGCX	AGTEN	DWCX	MLLCX	COMM	INDTEN	CHR/SCH	TRNSP
Agricultura History	1							
1/11:	H	Ħ	м-н	H	м-н	M-L	W-L	Ħ
III:	H	н	м-н	H	м-н	M-L	M-L	H
Commercial Industrial History	&							
I/II:	Ħ	H	M	H	H	Ħ	M-L	H
III:	H	H	м-н	Н	H	Н	M-L	H
Tenancy								
I/II:	H	H	M	M-H	M	Ħ	M-L	M-H
III:	н	Н	M-H	M-H	M	н	M-L	M-H
Subsistence Foodways	: &							
1/11:	M-H	M-H	м-н	M-H	M-H	M-H	M-L	M-H
III:	Н	H	H	м-н	м-н	H	M-L	M-H
Community Studies								
I/II:	H	H	H	H	Н	H	Н	Н
III:	м-н	M-H	м-н	M-H	м-н	м-н	м-н	H
Transportat History	ion							
I/II:	M-H	M-A	м-н	H	H	м-н	M-H	Н
III:	M	M	M	Н	Ħ	М	м-н	н

TABLE 19

DATA QUALITY BY SITE FUNCTION FOR ECONOMIC, COMMUNITY,
AND TRANSPORTATION STUDIES FOR 1820-1910

	AGCX	agten	DWCX	MLLCX	COMM	INDTEN	CHR/SCH	TRNSP
Agricultural History	ì							
I/II:	Ħ	H	M-L	Ħ	M	M-L	M-L	H
III:	Ħ	H	M-L	H	М	M-L	L	H
Commercial & Industrial History	<b>&amp;</b>							
1/11:	Ħ	H	M-L	Ħ	H	Ħ	M-L	Н
III:	H	Н	M-L	Н	H	Н	L	H
Tenancy								
1/11:	H	Н	M	M-H	M-L	H	M-L	H
III:	H	H	M	M-H	M-L	н	L	м-н
Subsistence Foodways	&							
1/11:	M-H	м-н	M-H	М	M	M-H	Ľ	M
III:	Н	H	H	M-H	M-H	Ħ	L	M-L
Community Studies								
I/II:	H	Н	H	H	H	Ħ	H	H
III:	M-H	м-н	M-H	м-н	м-н	M-H	м-н	. Н
Transportat History	ion							
I/II:	M-H	M-H	H-M	Н	Н	M-H	м	H
III:	M	м	M	H	Ħ	М	м	Ħ

TABLE 20

DATA QUALITY BY SITE FUNCTION FOR ECONOMIC, COMMUNITY,
AND TRANSPORTATION STUDIES FOR 1910-PRESENT

	AGCX	agten	DWCX	MLLCX	COMM	INDTEN	CHR/SCH	TRNSP
Agricultura History	1							
I/II:	H	H	M-L	H	M-H	M-L	M-L	H
III:	Н	H	L	H	M-H	L	L	H
Commercial Industrial History	<b>&amp;</b> .							
I/II:	H	H	M	Н	H	Н	M-L	Ħ
III:	H	Н	M	H	H	н	L	H
Tenancy			•			•		
I/II:	Ħ	Н	M	м-н	н	H	M-L	Ħ
III:	H	Н	M	M-H	H	H	L	M-H
Subsistence Foodways	e &							
I/II:	M-H	M-H	M-H	M	M	M-H	L	M
III:	н	H	H	M-H	M-H	H	L	M-L
Community Studies								
I/II:	H	H	H	H	Н	Ħ	H	H
III:	М	M	M	M	M	М	М	H
Transporta History	tion							
1/11:	м-н	м-н	м-н	· H	Ħ	м-н	М	Ħ
III:	M	M	M	H	Н	М	м	H

TABLE 21

DATA QUALITY BY SITE FUNCTION FOR METHODOLOGICAL AND MATERIAL CULTURE STUDIES FOR 1630-1680

	AGCX	AGTEN	DWCX	MLLCX	COMM	INDTEN	CHR/SCH	TRNSP
Status & Wealth						•		
I/II:	H	H	H	M-H	M-H	H	M	M
III:	H	Н	H	H	H	H	M	M
Ethnicity I/II:	H	н	Н	м-н	M-H	Ħ	м-н	М
III:	H	н	H	H	M-H	H	M-H	M
Material Culture Studies								
I/II:	H	H	H	M-H	M-H	Н	M	M
III:	H	Н	Н	H	H	H	M-H	м-н

TABLE 22

# DATA QUALITY BY SITE FUNCTION FOR METHODOLOGICAL AND MATERIAL CULTURE STUDIES FOR 1680-1720

	AGCX	AGTEN	DWCX	MLLCX	COMM	INDTEN	CHR/SCH	TRNSP
Status & Wealth								
I/II:	H	. Н	H	МН	М-Н	H	М	M
III:	H	H	Н	H	H	Н	М	M
Ethnicity I/II:	н	H	Н	м-н	м-н	H	M-H	M
III:	H	H	H	H	M-H	Н	M-H	M
Material Culture Studies								
1/11:	Ħ	H	H	M-H	M-H	H	М	М
III:	H	H	Ħ	H	н	H	M-H	M-H

TABLE 23

DATA QUALITY BY SITE FUNCTION FOR METHODOLOGICAL AND
MATERIAL CULTURE STUDIES FOR 1720-1760

	AGCX	AGTEN	DWCX	MLLCX	COMM	INDTEN	CHR/SCH	TRNSP
Status & Wealth								
I/II:	H	H	H	M-H	M-H	H	M	M-L
III:	H	H	H	H	Ħ	Н	М	M-L
Ethnicity I/II:	Н	Н	Н	м-н	м-н	н	м-н	M-L
III:	H	H	H	H	M-H	H	м-н	M-L
Material Culture Studies								
I/II:	H	H	H	M-H	M-H	H	M	M
III:	H	Н	H	H	H	H	м-н	M-H

TABLE 24

DATA QUALITY BY SITE FUNCTION FOR METHODOLOGICAL AND MATERIAL CULTURE STUDIES FOR 1760-1820

	AGCX	agten	DWCX	MLLCX	COMM	INDTEN	CHR/SCH	TRNSP
Status & Wealth								
I/II:	Ħ	H	H	M-H	M-H	H	M	M-L
III:	H	н	Н	Н	Н	H	M	M-L
Ethnicity I/II:	H	н	Ħ	м-н	M-H	Н	. м	M-L
III:	H	Н	H	н	м-н	H	М	M-L
Material Culture								
\$tudies I/II:	Ħ	H	Ħ	M-H	M-H	H	M	M
III:	Ħ	Н	H	н	H	H	м-н	M-H

TABLE 25

DATA QUALITY BY SITE PUNCTION FOR METHODOLOGICAL AND
MATERIAL CULTURE STUDIES FOR 1820-1910

	AGCX	AGTEN	DMCX	MLLCX	COMM	INDTEN	CHR/SCH	TRNSP
Status & Wealth		•						
I/II:	Ħ	н	Ĥ	м-н	M-H	H	M-L	L
III:	Н	Ħ	Н	Ħ	H	H	M-L	L
Ethnicity I/II:	H	н	н	м-н	M-H	Н	M-L	L
III:	Н	Н	H	H	M-H	H	M-L	L
Material Culture Studies								
I/II:	H	H	H	м-н	м-н	H	M	M
III:	H	Н	Н	Н	Н	Н	М	М

TABLE 26

DATA QUALITY BY SITE FUNCTION FOR METHODOLOGICAL AND MATERIAL CULTURE STUDIES FOR 1910-PRESENT

	AGCX	agten	DWCX	MLLCX	COMM	INDTEN	CHR/SCH	TRNSP
Status & Wealth								
I/II:	H	H	Н	м-н	M	Н	r	L
111:	H	Н	H	м-н	M-H	H	L	L
Ethnicity I/II:	H	H	н	м	М	Н	. <b>L</b>	L
III:	Ħ	Н	H	M	M	н	. L	L
Material Culture Studies								
1/11:	H	н	H	H-M	M-H	Ħ	M-L	M-L
III:	Н	H	Н	н	Ħ	н	M-L	M-L

The present historic archaeological data base existing prior to any data recovery survey program consists of a number of urban and rural sites in Delaware and the Middle Atlantic region. The urban environment of Wilmington has been intensively explored by Thomas (1980), Wise (1980), Klein and Garrow (1984), Cunningham (1980), Beidelman et al. (1986) and Cultural Resource Group (1985). The excavation of several rural sites in northern Delaware under contract with the Department of Transportation has provided a significant data base for comparisons with site types in southern Delaware. The data recovery survey programs of these northern Delaware sites included questions on topics like settlement patterns, agricultural and industrial development, transportation networks, and other aspects of the region (Coleman et al. 1983, 1984, 1985; Coleman and Custer 1986; Catts et al. 1986; Custer et al. 1985; O'Conner et al. 1985; Heite and Heite 1985; Thompson and Gardner 1986).

A primary goal of this research design is to include work done in Delaware within as large a regional framework as possible. A substantial historical archaeological data base has been established for the Middle Atlantic region covering of a range of site types and locations, and data gathered from Delaware sites would be an important addition to our understanding of the history of the region. To facilitate discussion and apply the sites within the Corridor into as broad and diachronic data base as possible, the following research questions have been grouped into three major topical associations (1) settlement pattern and locational studies, (2) social, economic, and transportation studies, and (3) material culture These major topics correspond to those of Tables 9-26. studies. Specific sites within the Corridor that have the potential for particularly relevant data are included with each specific research question. A general discussion of related research questions and other possible sources of data based upon Tables 9-26 is included at the end of each major topical group. In the discussions of research questions, sample sites from both the entire Route 13 Corridor and the specific final alignment are Sites from the entire corridor are noted because they serve as examples of classes of sites which may be identified during the Phase I study of the final alignment. However, it should be understood that only those eligible sites located in the impact zone of the final alignment will be subjected to Phase III excavations.

## Settlement Pattern and Locational Studies

By studying the way in which people settled in Delaware it is possible to address a number of important issues in the history of Delaware and the region. Settlement pattern and locational studies are based upon how people perceived an area and how they consciously or unconsciously located their dwellings in response to the natural and man-made environments. In addition, the study of environment and cultural adaptation has long been a primary focus in prehistoric archaeology, particularly cultural ecology, and many of the same theoretical

perspectives and research strategies can be applied to historic sites (Miller 1980:4).

A number of significant research questions concerning historic settlement patterns in Delaware can be applied to the 1,973 historic sites identified thus far in the Route 13 Relief What principles governed site location in Route Corridor. Delaware during the historic period? Are historic sites in the state patterned similarly to those in other areas of the Middle What is the relationship between the physical Atlantic? environment and settlement patterns in Delaware and the region? Similarly, how does site location vary through time in response to changes in markets, transportation, and agricultural developments and between different areas within Delaware, specifically New Castle versus Kent counties? Current research on the Route 13 Corridor (Custer and Grettler 1986) has identified a number of significant patterns for historic site location and further work appears promising. The factors influencing changes in settlement patterns are complex and the synthesis of the geographical and archaeological data generated by further research at all mitigation levels (Tables 9-14) would be an important addition to the available data base (Wise 1978, 1979a, 1979b, 1980; Gardner 1979; Henry 1981).

As shown in Tables 9-14, every type of historic site, over the entire historic period, could be significant for settlement pattern research questions. Detailed information about specific sites as recovered during Phase III excavations, however, is not always necessary. Rather, settlement pattern studies are most efficiently pursued through large-scale, non-random comparisons of the primarly locational data recovered by Phase I and often Phase II operations.

One particular strength of the existing Route 13 historic data base in settlement pattern studies is the wide range of site types exhibited in the period from 1820 to 1910. Nearly 78% (Table 6) of the historic sites identified thus far in the Corridor date to this period and include such diverse types as "peach houses" (N-1493, N-117, N-110), industrial tenant dwellings (160, 165, 431, 432), and railroad stations (56, 383). As has been noted, ongoing settlement pattern analysis of the Route 13 Corridor (Custer and Grettler 1986) of the 1820-1910 period has begun to outline a rather extensive picture of life in central Delaware during this time. This extensive picture of life is possible because of the number and range of commercial, industrial, agricultural, and dwelling sites found in the Corridor and the ability of settlement pattern studies to integrate such diversity into a valid historical context.

Settlement pattern studies not only reconstruct the historic built and natural environment at any single time, but also assess the stability through time of different settlement and land use patterns. By studying the boundaries of different parcels through time, and by comparing different land use systems, it is possible to test specific hypotheses about the history of

Delaware and the region. Thus, one facet of settlement pattern studies is to utilize land use and inheritance patterns as an "artifact" (Carter 1983:xiv; Heite and Heite 1981:1) of the historic occupation of Delaware. One specific hypothesis within settlement pattern studies that could be tested is Carville Earle's observation that along the western shore of the Chesapeake, a prevalence of short-term farm tenancy in an area tended to perpetuate and increase chaotic land holdings as farm boundaries and acreages were continually being shifted and disputed (Earle 1975:182).

The survey of deed, court of common pleas, chancery court, and other archival records completed by Phase I/II research could be used to test Earle's hypothesis and add significant data to our understanding of historic site location and farm tenancy in Delaware. This particular hypothesis is also supported by the large number (399) of agricultural tenant sites in the Corridor (Table 8). Examples of particularly well preserved tenant sites within the corridor, with a high probability of intact subsurface features and/or standing structures include K-2742, K-3582, K-4009, K-1613, 660, N-5856, 1031-1033, and K-2066.

Such a survey of archival resources, supported by archaeological and material culture data from controlled surface collections, test excavations, and architectural investigations found in Phase I/II research could also be used to address related questions. For example, how permanent were farm and lot boundaries in the study area? How does the Corridor compare to other areas in Delaware and the Middle Atlantic? Again such specific questions could be used to address larger paradigms in American history. One such area of interest is the use of known trends in land ownership and inheritance patterns to mark larger changes in regional economic and social conditions (Mitchell As with the other 1978:70; Earle 1975:104-105, 131, 165). research questions posed here, this paradigm encompasses a number of major research topics, including agricultural and economic history, material culture studies, and social history. interdisciplinary nature of such research questions is reflected in Tables 9-14.

Related to settlement pattern studies is the question of "frontier" development in the Middle Atlantic region. The term "frontier" is used here to refer to the earliest periods of settlement within the region and with the understanding that "frontier" in the classic sense applies to only a very short period in Delaware history. Although only six sites from the 1630-1720 time period are in the Corridor, relatively little is known about the earliest settlements in Delaware and any data gathered would be an important addition to the current data base. Two of the six sites identified in the Corridor from this period are K-955 and N-3920. Both of these sites are agricultural complexes and have been identified as significant in previous studies (Custer et al. 1984; Custer, Bachman, and Grettler 1986) and have a high potential for undisturbed archaeological features. Further work at types of sites within the final

alignment at both the Phase I/II and Phase III levels could yield significant data (Tables 9 and 10). Due to the scarcity of seventeenth and early eighteenth century sites in the region, any such sites would be significant resources for research questions concerning Delaware's early history (Tables 9, 10, 15, 16, 21, 22).

A number of specific questions concerning both settlement patterns and frontier development can be raised concerning this period. How was early Delaware settled, in particular southern New Castle and Kent counties? How was the area and its environment perceived by those who settled in the region? How did these settlers consciously or unconsciously locate their dwellings in response to the environment? Was the "long lot" system of land use identified for Maryland, New Jersey, and parts of Delaware (Wise 1979b, 1980; Wacker 1975: Chapter 4) used in the study area? Questions such as these show the close relationship between different classes of current research interests, particularly for this earliest period in Delaware's history. Again, a substantial amount of work on this subject has been completed in the region and these questions are designed to suggest ways in which further work on the Route 13 Corridor can support this existing data base.

Research questions involving both settlement pattern and frontier development can be addressed in a number of ways. First of all, synchronic and diachronic comparisons of known site types and locations identified in Phase I and II surveys can be used to establish settlement patterns and to mark changes over time. Since a variety of site types are represented in the Corridor, the potential overall quality of Phase I and Phase II is high (Tables 9-14). Historic sites from the earliest periods of Delaware history, those most useful for frontier studies, are particularly significant (Tables 9-14).

A second major way to pursue settlement pattern and frontier development studies is through the testing of specific archaeological hypotheses. For example, current frontier development models (Green and Perlman 1985; Pogue 1986; Foss 1984) assume that as European settlers met new environmental conditions, they developed new, different ways of living. After this period of initial variability, a trend towards standardization is hypothesized as environmental conditions selected for the most useful adaptations. Archaeologically, then, early sites in Delaware should show an initial period of variability in such attributes as layout, use, and material culture assemblage with a gradual increase in standardization between sites over time. Current research in northern Delaware (Shaffer 1986) supports this general model and data gathered from sites in southern New Castle and Kent counties would be an important addition to the existing data base.

Research questions such as these, in part answerable by an intensive historic geographical and archaeological survey, in turn generate data applicable to other questions in American

history and historical archaeology (Miller 1980:3-4; Wesler 1982:18-19; Wacker 1975:xvii). For example, how significant is the timing of interior settlement patterns, particularly in the areas north and west of the St. Jones River, as postulated for other areas by Lemon (1972:42) and Mitchell (1978:80)?

Although only six pre-1720 sites have been identified thus far, it is likely that more such sites, particularly components of later sites, exist in the Route 13 Corridor. The area south and east of Dover along Puncheon Run and the St. Jones River and the Blackbird and Appoquinimink areas are particularly likely to contain further significant early historic sites.

Related to both Delaware's early history and settlement patterns is the question of farmstead design. Farmstead design in Delaware and the Middle Atlantic has been the focus of a number of studies in a variety of disciplines, particularly architectural history (Herman 1982; Del Sordo 1984; Eberlein and Hubbard 1962; Carson et al. 1981; Wells 1982) and (Glassie 1968, 1972). How were agricultural complexes laid out? What was the arrangement and function of dwellings, outbuildings, and yard areas and how was each used? In a more general sense, where were early farmsteads placed within each land parcel? relative importance of transportation, soils, markets, and other factors should be studied further on both a site-specific and community basis to determine how they influence farmstead design and placement through time. For the earliest periods of Delaware history, farmstead design is hypothesized to be one of the main variables in the suggested trend towards standardization of adaptive strategies.

A number of sites in the Route 13 Corridor could yield significant data on farmstead and houselot design. Most of the sites in the Corridor are either agricultural (64%) or dwelling complexes (23%, Table 8) and both Phase I/II and more intensive Phase III studies are expected to yield significant data (Tables 9-14).

In conclusion, research questions concerning settlement patterns, frontier dynamics, and farmstead/houselot design can be applied to a range of historic sites. These questions reflect the strengths of the existing Route 13 data base and include both synchronic and diachronic components. These components in turn address other issues in the history of Delaware and the region. Historic sites that are likely to generate useful data are found throughout the 58 mile corridor as both standing structures with associated archaeological remains and as distinct historic archaeological sites. Comparative data from a large variety of sites, particularly at the Phase I/II level, is well suited to discussions of settlement patterns, changes in land use and inheritance, and Delaware's early history. More intensive and site-specific data, such as that commonly recovered in Phase III programs, provides valuable information for research questions dealing with frontier dynamics and farmstead/houselot design.

### **Economic and Transportation Studies**

The second major group of research questions that can be applied to the Route 13 Corridor concern the social and economic history of southern New Castle and Kent counties, and by implication, of Delaware and the Middle Atlantic region. Corridor is and has been primarily an agricultural region, changes in transportation and agriculture have played a key role in the social and economic history of the region and will be Also, as most of the sites in the given special emphasis. Corridor date from 1820-1910 and current research (Custer and Grettler n.d.) has identified a number of statistically significant trends, special emphasis will also be given to this period. For every period, the growth of communities, particularly as a barometer of economic conditions will be considered. Historic sites that can be expected to yield significant data to particular aspects of these research questions are summarized in Tables 15-20.

The general shift through time from subsistence to marketoriented agriculture is one possible focus for study within the
agricultural history of Delaware (Mitchell 1978:4). Research on
such a shift would involve a detailed understanding of a variety
of issues including 1) the primarily subsistence-oriented
agriculture of the seventeenth and early eighteenth centuries, 2)
the growth of wheat and other small grain agriculture in the
eighteenth and nineteenth centuries, 3) the partial collapse of
this wheat-based economy in the 1810s and 4) the revival and
renaissance of agriculture in the nineteenth and early twentieth
centuries with the advent of new techniques, crops, and markets.

As can be seen, this shift towards marketable foodstuffs is extremely complex and encompasses numerous issues within the agricultural history of Delaware. As noted by Barbara Clark Smith, Delawareans throughout the historic period balanced farm and family needs with subsistence and cash crop opportunities and that this shift is more a matter of a change in emphasis than a complete economic reorientation (Smith 1985).

A number of specific questions concerning this overall trend towards marketable crops in the agricultural history of the region. What kinds of agricultural goods were sold in Delaware through time? What kinds of technological demands did different crops impose and how did farmers meet them? How "flexible" were farmers historically and how was Delaware affected by fluctuations in local, regional, and international markets? Agricultural sites within the Corridor that could yield significant data include N-3965, N-5038, N-5042, K-1366, and K-4011.

Both Phase I/II locational and Phase III data recovery survey programs of a variety of agricultural and commercial sites would be needed to detail the agricultural history of southern New Castle and Kent counties (Table 15-20). A careful exploration of archival resources such as agricultural censuses, court

records, and land advertisements would be a good first step in determining local agricultural preferences and understanding the overall pattern of agricultural land use through time in Delaware.

Apart from a need to study changes in Delaware's agricultural and economic history, specific questions concerning farm life need to be addressed (Wesler 1982:18; Henretta 1978:3). Did farmers grow most of the food their families consumed? How much income was earned and how was it spent? What proportion went to food, rent, clothing, tools, taxes, and household goods? How were these goods exchanged between neighbors and within the community? Questions such as these point to a larger paradigm in American history—to what degree were farmers self-sufficient and how did this change over time? Much has been written about the traditional self-sufficiency of American farmers (Loehr 1952; Henretta 1978:13-16, 20; Merrill 1977; Bidwell and Falconer 1941; Hofstadter 1957) and the study of the wide range of farm sizes represented in the Route 13 Corridor could yield valuable data.

Specifically, it would be necessary to intensively test a range of farm, particularly agricultural complexes and tenant sites, and farm-related sites, particularly mills and stores, to determine self-sufficiency and the domestic economies of specific sites. Data recovered from intensive Phase II and III excavations of farmsteads of different socio-economic levels, including agricultural tenant sites, could form a significant data base of inter-farm and community comparisons (Tables 15-20).

Research questions concerning farm life and self-sufficiency point towards the need for a more complete understanding of the lower class of non-landed tenant farmers (Bausman 1933). Agricultural tenancies are well represented in the Corridor with 399 such sites located thus far (Table 8). Few of their dwellings, however, survive and the historical record makes little reference to the role played by this group in the rural society. Only one agricultural tenant dwelling (K-2742) is extant. Most known agricultural tenant dwellings are of less substantial construction and appear to be situated near the roadsides of each farmstead, while the landowner's more imposing dwelling is located back from the road. How this is related to the agricultural community and the general social structure of the region has not yet been fully addressed.

The geographic and archaeological data generated by all subsequent data recovery survey programs for the Route 13 Corridor would greatly increase our present understanding of the agricultural history of Delaware (Tables 15-20). Particularly exciting is the possibility of substantial data from farms of different size and socio-economic levels and from a variety of agricultural and commercial settings. Catts et al. (1986), Coleman et al. (1984, 1985), and Lothrop (1986) have tested and partially excavated a number of agricultural tenant sites in northern Delaware. Further work in the Route 13 Corridor could add to this data base and would allow more complete

generalizations to be made about all classes of farms in New Castle and Kent counties. This is especially true for the 1850-1880 time period in which the greatest number of agricultural tenant sites with a high potential for archaeological features in good context are found. Example sites include K-266, N-5087, K-3840, K-257, and K-3844.

Transportation has always been a key factor in the agricultural and economic history of Delaware and further research questions could target additional areas of study (Heite and Heite 1982; Henry 1981:45). Various modes of transportation have been utilized in the study area through time and with these shifts in emphasis have come subtle changes in town development and size (Lemon 1967:503), rural settlement pattern, population density, and manufacturing opportunities such as carriage making, tanning, and foodstuff processing. The impact of railroad transportation on Middletown, Clayton, Kenton, and a number of other towns in Delaware is one example of the effects of changes in transportation. The effects of such changes in the Middle Atlantic region are extremely complex (Taylor 1951) and future research could seek to identify and assess these changes through site and locale-specific data.

Approximately 25 transportation related historic sites have been identified in the Route 13 Corridor (Table 8). Transportation sites include bridges (N-1309, K-5644), canal company buildings (59), landing operations (K-202, N-3918, 66), and railroad (338, 553) and stagecoach (N-6303) related sites. Transportation sites are probably under-represented in the Corridor, particularly for the earlier time periods. Landing operations in particular are under-represented as most farms with access to navigable water possessed landings as part of their regular operations. And as water transportation was of primary importance prior to the wide-spread development of consistently good roads in the early nineteenth century, landings were an important part of many early Delaware farms.

As mentioned, the earliest forms of travel in the Route 13 Corridor were probably by boat and on foot, as the few early roads were frequently unsuitable for cart travel. Landings and the heads of navigable streams became transshipment centers and thus foci for settlement. During the early nineteenth century, the establishment of adequate roads and then railroads altered the commercial pattern and emphasized the junctions of these later modes of travel. Hamlets grew up around road/railroad intersections and places like Seven Hickories, Dinah's Corner and Pearsons Corner were eclipsed by Hartly, Kenton, and Cheswold and other towns through which the railroad passed. Research within the proposed Route 13 Corridor could try to reveal the mechanisms of this change and document its ramifications for village life, commercial patterns, and population change.

As previously mentioned, landing sites along the navigable portions of streams in the study area, particularly along the Near West/Near East alignment, could provide another focus for

research. Landings were an integral part of regional transportation and economic systems throughout the historic period, yet virtually no documentation exists as to their actual location, location in relationship to other sites, size, use, or construction.

In addition to the seven landing sites identified thus far in the Corridor, 60 major commercial landings have been located near the study area. The four other landing sites in the Corridor are historical archaeological sites 430, 433, 429, and 841. Eighteenth and nineteenth century land advertisements frequently detail small private landings as part of the improvements made on a property and a detailed survey of available archival resources conducted as part of Phase I and II programs could yield significant data on these important links in the agricultural and commercial economies of the region (Tables 15-20).

One of the features of the early road network was taverns or inns placed at intervals along the major thoroughfares (Ward 1968). If the establishment could be situated at a crossroads, so much the better. Research into the Buck Tavern, at Summit Bridge, Delaware (Wilkins and Quick 1976), the Mermaid Tavern and Tweed's Tavern on Limestone Road (Catts et al. 1986), and the William H. Anthony Hotel in Stanton (Thompson and Gardner 1986) suggests that rural inns and taverns in Delaware were licensed, but often ephemeral businesses which were often contained in farmhouses or dwellings only slightly modified for the purpose. Tavern and inn sites within the Corridor that could yield significant data include N-1503, K-3271, 64,823 and 824. Phase I, II, and Phase III research on such sites, especially when integrated with specific data on the economic and transportation history of the region, could be a significant contribution to the existing data base (Tables 15-20. Taverns and inns are included in the "commercial" site type.)

Significantly, further research on the Route 13 Corridor offers the opportunity to study on a large scale community development and, in some instances, decline in rural Delaware. One of the most prominent features of Delaware history is the waxing and waning of hamlets and other "crossroad" communities as local service and transportation centers according to local and regional economic conditions. Thus far, over 100 such communities have been identified in the Route 13 Corridor. As barometers of larger social and economic changes, the study of crossroad communities such as Boyd's Corner, Pine Tree Corners, and Big Oak Corners (all of which are in the final alignment) and "mill towns" such as Noxontown could be used to study urbanism in a largely rural, pre-industrial context. The data produced by such a study would augment existing local studies (Heite and Heite 1985, 1986) and could become an important part of a diachronic study of regional community development in Delaware and the Middle Atlantic.

Both Phase I/II and Phase III survey programs could yield significant data for community studies. Phase I/II programs would be best suited for primarily locational studies. Dwelling, commercial, and industrial sites are most likely to yield significant data for community studies as agricultural sites are less likely to be located in urban areas. Agricultural sites, however, would be an important part of the economic history of the area and would be significant for community studies in that respect. For site and community specific studies, Phase III programs are likely to yield significant data. Transportation related sites could yield significant data for community studies at all levels of study (Tables 15-20).

Detailed information on landings, transporation, and "crossroad" communities could be used to address additional research questions. For example, how did Philadelphia, Baltimore, and New York influence the concentration of storing, loading, and other commercial facilities in Smyrna, Smyrna Landing, Dover and other commercial centers in southern New Castle and Kent Counties? What is the relationship between these changes in transportation and markets and the diachronic trend in Delaware agriculture towards more diversified and market-oriented crops? On a more specific level, what is the relationship between the tremendous growth of the Smyrna Landing area in the mid-nineteenth century and the large-scale production of perishable truck and orchard crops, particularly peaches and tomatoes, in that area? The Smyrna area contains over 60 agricultural and commercial sites including agricultural complexes (925, K4250, K-4002), tenant residences (786, K-4009, K-3939), warehouses (N-135, 433-440), manufactories (K-4026, 925, 427), and landing operations (429, K-202).

Three of these sites in the Smyrna area are particularly significant. The first archaeological site, 433, is associated with the site of a pre-1868 commercial structure that has served as a manufactory, landing operation, and warehouse. Further work at this site, even though the original structure has been removed and some evidence of machine disturbance exists, could yield significant data on the commercial development of the Smyrna area. A similar range of functions has been attributed to historic archaeological site 925. This site is a pre-1868 agricultural complex and manufactory and has been associated with one archaeological feature, a foundation (Custer, Bachman and Grettler 1986). In addition, the potential for other subsurface features is high. The third site, 786, is a industrial tenant house from the period 1868-1893. This standing structure has one related outbuilding and also has a high potential for archaeological features in an undisturbed context. Historic sites such as these could be expected to yield significant data at all levels of any eventual mitigation programs (Tables 15-20).

As can be seen from the examples given, historic sites from the mid-nineteenth century to the early twentieth century are particularly well represented in the Smyrna area (Table 8). Within this period, 29 sites, including warehouses, industrial

tenant dwellings, and commercial sites have been identified. This range of commercial and industrial sites could offer significant information at all levels of investigation about the growth and subsequent decline of the Smyrna area.

Data gathered from the Smyrna area and compared to similar data from the Blackbird, Appoquinimink, and Leipsic areas could form the basis of a larger study of the commercial, industrial, and agricultural economies of southern New Castle and Kent counties.

Approximately 99 historic sites have been located in the Blackbird area, including a number of mills (294, 295), tenant dwellings (325, N-3921, N-5879), and commercial sites (N-5849, N-5851, 288). Three of these sites could prove particularly significant. Historic archaeological site 295 is a pre-1849 sawmill complex along Blackbird Creek and has associated Representative of tenant dwellings in archaeological features. the area is K-5879. This archaeological site has been associated with an agricultural tenant dwelling from the period 1849-1868. Although the structure has been removed, K-5879 is relatively undisturbed and the potential for intact subsurface features is Representative of commercial sites is N-5851. standing structure is a pre-1868 railroad station and store and has been associated with two extant outbuildings and a high potential for intact archaeological features. Further work, at all levels, at sites such as these could yield significant information on the social, economic and transportation history of Delaware and the Middle Atlantic region (Tables 15-20).

In the Appoquinimink area, 68 historic sites have been identified (Custer, Jehle, Klatka and Eveliegh 1984). As with the Smyrna and Blackbird areas, the Appoquinimink area had been occupied since the early eighteenth century and further research at all levels could offer a diachronic as well as synchronic perspective to current research questions (Tables 15-20). Approximately 37% of these Appoquinimink sites offer a high potential for the recovery of significant archaeological data from undisturbed contexts. Sites in the Appoquinimink area include a variety of commercial and agricultural types. Agricultural types with a high potential for undisturbed archaeological remains include agricultural complexes (N-5902, N-5898, 179), peach estates (N-432, N-110) and tenant houses (255, Commercial sites with a high archaeological potential include mills (161, 229) and manufactories (255, N-417). Industrial tenant dwellings are also represented (164, 165). Further work, at all levels, on sites such as these could yield significant data, especially if compared to similar sites in the Blackbird, Smyrna, and Leipsic areas.

The Leipsic area also contains a number of significant resources for the study of the commercial, industrial, and agricultural economies of central Delaware. This area contains seven mill sites, both as standing structures with associated archaeological sites (K-833, K-1395, K-238) and archaeological

sites (556, 557, 552, 476). Each of these mill sites are relatively undisturbed and offer a high potential for archaeological features in good context. Industrially related sites include four industrial tenant archaeological sites (55, 559, 583, 584). While generally less well-preserved than the mills, each of these tenant dwellings offer at least a moderate potential for intact archaeological features.

Agricultural sites compose the bulk of the sites in the Leipsic area with agricultural complexes and tenant dwellings particularly well-represented. Twenty-four agricultural sites, including three eighteenth century estates and complexes. Two of these eighteenth century agricultural complexes (K-1395, K-238) have also been associated with milling activities. Further work at both these sites, in conjunction with other agricultural and milling sites in the area could yield significant data at all levels of study (Tables 15-20).

Not to be overlooked is the impact of the construction of the present Route 13 on the lifeways of the people of the Upper Delmarva Peninsula. This road, which essentially replaced an older Philadelphia to Lewes Post Road, drastically altered the traffic pattern on the Delmarva when it was opened in the early 1920s. Many historic sites in the Corridor date to this period, particularly as standing structures. The Camden and Star Hill areas along the present Route 13 contain 29 dwellings and dwelling complexes dating from the 1920s to 1945. Further research, at both the Phase I/II and Phase III levels, could expand our present knowledge of the tremendous social, political, and economic changes initiated by the DuPont Highway (Tables 15-20).

In conclusion, research questions concerning the agricultural, economic, and transportation history of southern New Castle and Kent counties can be applied to a range of historic sites. These research questions reflect the strongly agricultural nature of the Route 13 Corridor and place this heritage within a regional social, economic, and technological Historic sites that are likely to produce useful data context. are found throughout the Corridor and include a wide range of Data generated from specific sites could be site types. productively compared with sites in other areas, especially among and between the Smyrna, Blackbird, Appoquinimink, and Leipsic areas. Such a wealth of data could form the nucleus of a larger study of the economic history of central Delaware and the Middle Atlantic region. These research questions are generally well suited for the efficient use of both Phase I/II and Phase III Transportation studies, in particular, offer the surveys. opportunity to trace developments in the agricultural, commercial, and industrial history of central Delaware from the earliest periods to the present.

### Material Culture Studies

The last major group of research questions that can be applied to the Route 13 Corridor concern specific methodological questions within historical archaeology and material culture studies. Methodological research questions seek to refine the way in which we gather, analyze, and interpret archaeological and historical data. Very often, research aimed at methodological concerns involve gathering data relevant to specific topical research questions, particularly those within social history and economic studies. Thus, these material culture methodological questions have bearing on almost every aspect of historic archaeology, with the possible exception of strictly locational studies (Tables 21-26).

One current methodological question within historical archaeology involves the use of material remains to determine social and economic status. Determinations of status and wealth through material remains is based on the seemingly common sense premise that wealthy or higher status households should contain different, i.e. more expensive, artifacts than poorer ones. Material culture assemblages from different ethnic groups are expected to vary according to different cultural precepts and traditions. Artifacts that supposedly show these differences in wealth and status best are ceramic assemblages and types, particularly expensive imported or luxury wares and other household items (Miller and Stone 1970; South 1972). Recent studies, however, have found this model to be too simplistic. an effort to refine this model, various limitations have been Stanley South has stated that status differences are introduced. reflected better in seventeenth rather than eighteenth or nineteenth century material culture assemblages and that analysis of ceramics by shape (function) is more sensitive than by type (South 1972). More recent studies have made further attempts to refine this model for status, wealth, and ethnic differences through extensive intra-site comparisons (Otto 1977) and various improved economic and social scales for determining high status ceramics (Miller 1980) and accounting for differential archaeological preservation, salvaging and recycling, and disposal patterns (Rodeffer 1984). Despite these efforts, the equation of artifact, particularly ceramic, assemblages with wealth and status is much more complex than simply "the rich buy expensive and the poor buy cheap" (Foss 1985:2).

In addition to artifact assemblages, archaeologists and material culturalists have looked to other social and economic factors, particularly subsistence patterns and foodways, to determine status, wealth, and especially ethnicity from the material record (Schuyler 1980). Foodways, or how food is prepared, served, and stored has proven to be a particularly significant factor in the interpretation of historic sites and further work appears promising. Food preparation, butchering practices, and seasonality seem to be particularly sensitive factors in the material culture record (Bowen n.d.). In addition, foodways and subsistence have been extensively studied

from a variety of disciplines (Anderson 1971; Champ 1979) and further work on the Route 13 Corridor, particularly at the Phase III level, could be an important addition to the extant data base (Tables 21-26).

With regard to research on food ways and subsistance patterns, artifact assemblages from different sites of known socio-economic levels and similar functions could be compared to determine the extent to which archaeologically derived data can be used to make reliable inference about social and economic conditions. The large number of dwelling sites, including agricultural complex and tenant sites, in the Corridor could constitute a particularly fertile resource for the recovery of significant material culture data (Tables 21-26). Commercial, transportation, municipal, and other sites with minimal occupation are expected to be less likely to yield significant comparative data (Tables 21-26).

A second major methodological concern within historical archaeology and material culture studies is the integration of archaeological and material culture data with more traditional historic resources such as inventories, orphan's court and probate records? How best can archaeological and material culture data and archival resources be used together? What can such data explain about the past? If the material record and archival sources disagree, how best can discrepancies be resolved? How best can oral histories be used within the archaeological record (Duranceau 1983)? Are physical remains inherently more objective and less biased than written records? How do artifacts and archaeological data depict change and what kind of data tells us the most about past human behavior?

Questions such as these point to the need for a tighter definition of the role of material culture and archaeological evidence in historical research. A number of attempts have been made (Deetz 1977; Issac 1982; Glassie 1968; South 1972; Schlereth 1985) and the most promising approach appears to be a rough equality between both data bases, with historic and archival research providing the major hypotheses. According to this view, material culture is seen as one type of historical evidence with its own set of inherent strengths and weaknesses (South 1977; Schlereth 1985). Further work on the Route 13 Corridor, at all levels and site types, could help to identify these variables and begin to formulate corresponding hypotheses (Tables 21-26).

In conclusion, research question concerning methodological and material culture studies can be applied to nearly every site within the Corridor. Even sites of limited preservation or integrity can pose situations which foster the development of new and different methodologies. These research questions reflect many of the theoretical frameworks and historical models currently being applied to historic archaeological sites and add to our understanding of past lifeways in two ways. First of all, methodological and material culture research questions serve to refine the accuracy and precision with which we gather and

interpret historical data. Secondly, in refining the way in which archaeologists reconstruct past lifeways, they often gather data relevant to larger historical issues. For example, methodological research questions dealing with determinations of wealth and status not only expand the way in which archaeologists interpret archaeological and material culture data, but also adds substantially to our understanding of specific social and economic conditions. Detailed data from Phase III and sometimes Phase I/II survey programs are best suited to answer methodological and material culture questions (Tables 21-26).

Historic sites that are likely to yield significant data are found throughout the Corridor, with short occupation dwelling sites expected to yield the most information (Beidleman 1986). Wealth, status, and ethnicity research questions in particular are best answered by such sites (Tables 21-26). The primary limitations on sites likely to yield significant data are preservation and overall site integrity. Data from disturbed areas are less useful, but may pose situations which encourage new and imaginative solutions.

In conclusion, the varied prehistoric and historic archaeological sites located within the Route 13 alignment have the potential to yield significant data relevant to a wide variety of research questions. Careful collection of the data from these sites will help to guide studies of these research issues in the future.

#### REFERENCES CITED

- Acrelius, Israel.
- 1874 A History of New Sweden. Translated by William M. Reynolds, D. D. In **The Memoirs of the Historical**Society of Pennsylvania, vol. 11. The Historical Society of Pennsylvania, Philadelphia.
- Anderson, Jay
  1971 Food and Folklore: A Special Issue. **Keystone Folklore**Quarterly (16):153-214.
- Ball, Duane E.
  1976 Dynamics of Population and Wealth in Eighteenth-Century
  Chester County, Pennsylvania. Journal of Interdisciplinary History 6(4):621-644.
- Bausman, Richard O.

  1933 The Economic and Historic Background of Farm Tenancy in
  Delaware. Journal of Farm Economics 15(1):164-167.
  - An Economic Study of Land Utilization of KentCounty, Delaware. University of Delaware Agricultural Experimental Station Bulletin #224. Newark, Delaware.
  - An Economic Study of Land Utilization in New Castle County, Delaware. University of Delaware Agricultural Experimental Station Bulletin #228. Newark, Delaware.
- Beidleman, D. Katharine, Wade P. Catts, and Jay F. Custer
  1986

  Final Archaeological Excavations at Block 1191, King
  to French Streets, Wilmington, New Castle County,
  Delaware. Delaware Department of Transportation
  Archaeological Series 39. Dover, Delaware.
- Bidwell, Percy W. and John I. Falconer
  1941 History of Agriculture in the Northern United States,
  1620-1860. Peter Smith, New York.
- Bonfiglio, A. and J. H. Cresson
  1978 Aboriginal Cultural Adaptation and Exploitation of
  Periglacial Features in Southern New Jersey. Paper
  presented at the 1978 Middle Atlantic Archaeological
  Conference, Rehoboth Beach, Delaware.
- Bowen, Joanne n.d. Seasonality: An Agricultural Construct. In Documentary Archaeology in the New World, edited by Mary C. Beaudry, (in press). Cambridge University Press, Cambridge.
- Braun, E. L.
  1967 Deciduous Forests of Eastern North America. Hafner,
  New York.

- Carbone, V. A., A. Segovia, J. Poss, M. Sheehan, D. Whitehead, and S. Jackson
- Paleoenvironmental Investigations Along the Savannah River Valley, Richard B. Russell Dam and Lake Project. Paper presented at the 1982 Eastern States Archaeological Federation, Norfolk, Virginia.
- Carson, C., N. F. Barka, W. M. Kelso, G. W. Stone, D. Upton 1981 Impermanent Architecture in the Southern American Colonies. Winterthur Portfolio 16:135-196.
- Carter, Harold
  1983 An Introduction to Urban Historical Geography. Edward
  Arnold, Baltimore.
- Catts, Wade P., Mark Shaffer, and Jay F. Custer

  1986 A Management Summary of the Phase I and II

  Archaeological Survey for the Route 7 North (Limestone Road) Corridor. Milltown to the Pennsylvania State Line, New Castle County, Delaware. Delaware Department of Transportation Archaeological Series 47. Dover, Delaware.
- Cavallo, J. A.

  1981 Turkey Swamp: A Late Paleo-Indian Site in New Jersey's
  Coastal Plain. Archaeology of Eastern North America
  9:1-18.
- Champ, Charles
  1979 Food in American Culture: A Bibliographic Essay.
  Journal of American Culture (2): 559-570.
- Coleman, Ellis C. and Jay F. Custer

  1986

  A Management Summary of the Phase I and II
  Archaeological Surveys for the Planned Ogletown
  Interchange, Newark, New Castle County, Delaware.
  Delaware Department of Transportation Archaeological
  Series 42. (in press). Dover, DE.
- Coleman, Ellis C., Kevin W. Cunningham, David C. Bachman, Wade P. Catts and Jay F. Custer
- 1983 Final Archaeological Investigations at the Robert Ferguson/Weber Homestead, Ogletown, New Castle County, DE. Delaware Department of Transportation Archaeology Series 16. Dover, DE.
- Coleman, Ellis C., Kevin W. Cunningham, James O'Connor, Wade P. Catts, and Jay F. Custer
- Phase III Data Recovery Excavations of the William M. Hawthorn Site 7NC-E-46, New Churchman's Road, Christiana, New Castle County, Delaware. Delaware Department of Transportation Archaeology Series 28. Dover, Delaware.

- 1985 Intensive Archaeological Investigation of the Wilson/Slack Agricultural Complex, Newark, New Castle County, Delaware. Delaware Department of Transportation Archaeological Series 34. Dover, Delaware.
- Conrad, Henry C.

  1908 History of the State of Delaware, Vol II. Wilmington,
  Delaware.
- Cultural Resource Group, Louis Berger and Associates
  1985 Cultural Resources Investigations of the Christiana
  Gateway Project Area: Fourth, French, Third, and King
  Street, Block 1101, Wilmington. East Orange, New
  Jersey.
- Cunningham, Kevin
  1980 Archaeological Investigations at the Wilmington
  Boulevard, Buildings 4, 16, 17, 18, 19, & 23, King
  to 4th Streets, Wilmington, New Castle County,
  Delaware. Delaware Department of Transportation
  Archaeology Series 14. Dover, Delaware.
- Cunningham, Kevin W., John W. Martin and Joann L. Clavert
  1980 Preliminary Cultural Resources Reconnaissance of the
  Proposed Dualization of U.S. Route 113, Little Heaven
  to Dover AFB, Kent County, DE. Delaware Department of
  Transportation Archaeological Series 13. Dover, DE.
- Curry, D. C. and J. F. Custer
  1982 Holocene Climatic Change in the Middle Atlantic Area:
  Preliminary Observations from Archaeological Sites.
  North American Archaeologist 3(4):275-285.
- Custer, J. F.
  1981 Report on Archaeological Research in Delaware, FY 19801981 by the Department of Anthropology, University of
  Delaware. Ms on file, Division of Historical and
  Cultural Affairs, Dover, DE.
  - A Reconsideration of the Middle Woodland Cultures of the Upper Delmarva Penninsula. In Practicing Environmental Archaeology: Methods and Interpretations. Occasional Papers of the American Indian Archaeological Institute No. 3, edited by R. Moeller, pp. 29-38. Washington, Ct.
  - 1983 A Management Plan for the Prehistoric Archaeological Resources of Delaware. University of Delaware Center for Archaeological Research Monograph No. 2. Newark.
  - 1984a Delaware Prehistoric Archaeology: An Ecological Approach. University of Delaware Press, Newark.
  - 1984b Accelerator Radiocarbon Dates from 18KE17. Newsletter of the Archaeological Society of Maryland 12:2-3.

- 1984c Paleoecology of the Late Archaic: Exchange and Adaptation. Pennsylvania Archaeologist 54(3).
- 1984d An Analysis of Fluted Points and Paleo-Indian Site Locations from the Delmarva Penninsula. Bulletin of the Archaeological Society of Delaware 16:1-28.
- 1986 Late Woodland Cultures of the Middle Atlantic Region.
  University of Delaware Press, Newark.
- Custer, J. F. and D. C. Bachman

  1986
  An Archaeological Planning Survey of Selected Portions
  of the Proposed Route 13 Corridor, New Castle County,
  Delaware. Delaware Department of Transportation
  Archaeology Series No. 44. Dover, DE.
- Custer, J. F., D. C. Bachman and D. J. Grettler

  1986
  An Archaeological Planning Survey of Selected Portions
  of the Proposed Route 13 Corridor, Kent County,
  Delaware. Delaware Department of Transportation
  Archaeology Series No. 45. Dover, Delaware.
- Custer, J. F., Wade P. Catts and David C. Bachman
  1982 Phase II Archaeological Investigations at Two Prehistoric Sites: 7NC-D-70 and 7NC-D-72,New Castle County,
  DB. DelawareDepartmentofTransportation Archaeology
  Series No. 24. Dover, DE.
- Custer, J. F., J. Cavallo, and R. M. Stewart
  1983 Paleo-Indian Adaptations on the Coastal Plain of
  Delaware and New Jersey. North American Archaeologist
  4:263-276.
- Custer, J. F., Ellis C. Coleman, Mark Shaffer and Collen DeSantis
  1985
  Phase I and II Archaeological Research of the Proposed
  Bridge 260 Replacement, County Road 346, Whitten or
  Walther Road, New Castle County, DE. Delaware
  Department of Transportation Archaeological Series 36.
  Dover, DE.
- Custer, J. F. and K. W. Cunningham

  1986 Cultural Resources of the Proposed Route 13 Corridor:

  An Overview Prepared for the Draft Environmental Impact
  Statement. Delaware Department of Transportation
  Archaeological Series 40. Dover, DE.
- Custer, J. F., T. Eveleigh, V. Klemas and I. Wells
  1986 Application of LANDSAT Data and Synoptic Remote Sensing
  to Predictive Models for Prehistoric Archaeological
  Sites: An Example for the Delaware Coastal Plain.
  American Antiquity (in press).
- Custer, J. F. and G. J. Galasso
  1980 Lithic Resources of the Delmarva Peninsula. Maryland
  Archaeology 16(2):1-13.

- 1983 An Archaeological Survey of the St. Jones and Murderkill Drainages, Kent County, Delaware. Bulletin of the Archaeological Society of Delaware 14:1-18.
- Custer, J. F. and D. R. Griffith

  1984 Analysis and Sedimentary Data from the Mitchell Farm
  Site (7NC-A-2), New Castle County, Delaware, and the
  Dill Farm Site (7K-E-12), Kent County, Delaware.
  University of Delaware Center for Archaeological
  Research Report No. 4. Newark.
- Late Woodland Cultures of the Southern Delmarva Peninsula. In Late Woodland Cultures of the Middle Atlantic Region, edited by J. F. Custer, pp. 29-57. University of Delaware Press, Newark, DE.
- Custer, J. F. and D. J. Grettler
  n.d. Analysis of Historic Site Locations on the Delaware
  High Coastal Plain. In Archaeology of the Route 13
  Corridor (in press).
- Custer, Jay F., Patricia A. Jehle, Thomas Klatka, and Timothy Eveleigh
- A Cultural Resource Reconnaissance of the Proposed Route 13 Highway Corridor, New Castle and Kent Counties, Delaware. DelawareDepartmentof Transportation Archaeology Series 30. Dover, Delaware.
- Custer, J. F. and S. C. Watson
  1985 Archaeological Investigations at 7NC-E-42, A Contact
  Period Site in New Castle County, Delaware. Journal
  of Middle Atlantic Archaeology 1:97-116.
- Delaware Division of Historical and Cultural Affairs
  1979 National Register Nomination for the Hughes Early Man
  Complex, Kent County, Delaware. Ms on file. Delaware
  Division of Historical and Cultural Affairs, Dover.
- Del Sordo S. G. (editor)

  1984

  To Build in the Best Manner: Vernacular Architecture in Middle Delaware. Delaware Division of Historical and Cultural Affairs, Dover.
- Del Sordo, Stephen and Alice Guerrant
  1985 Criteria of Periodization and Spatial Distribution.
  Ms. on file at University of Delaware Center for
  Archaeological Research. Newark, Delaware.
- Department of State
  1841 Compendium of the Sixth United States Census (1840).
  Thomas Allen, Washington, D. C.

- Deetz, James
- 1977 In Small Things Forgotten: The Archaeology of Early American Life. Anchor Press, Garden City, New York.
- Duranceau, Deborah A.

  1983 Oral History as a Tool of Historical Archaeology:
  Application on the Dolores Archaeological Project. In
  Forgotten Places and Things; Archaeological Perspectives on American History, edited by Albert E. Ward pp. 27-31. Center for Anthropological Studies,

Alberquerque, New Mexico.

- Earle, Carville V.

  1975

  The Evolution of a Tidewater Settlement System, All
  Hallow's Parish, Maryland, 1650-1783. University of
  Chicago Department of Geography Research Paper no. 170.
  Department of Geography, University of Chicago,
  Chicago.
- Eberlein, H. D. and C. U. D. Hubbard

  1962 Historic Houses and Buildings of Delaware. Delaware

  Division of Historic and Cultural Affairs, Dover.
- Eveleigh, T.

  1984 Late Archaic Projectile Points in the Middle Atlantic:
  What's in a Name? Paper presented at the 1984 Middle
  Atlantic Archaeological Conference, Rehoboth Beach, DE.
- Eveleigh, T., J. F. Custer, and V. Klemas
  1983 LANDSAT-generated Predictive Models for Prehistoric
  Archaeological Site Locations on Delaware's Coastal
  Plain. Bulletin of the Archaeological Society of
  Delaware 14:19-40.
- Flannery, K. V.
  1976 TheBarly Mesoamerican Village. Academic Press, New York.
- Review of In the Land of the Olmec by M. Coe and R. Diehl. American Anthropologist 84:442-447.
- Foss, J. E., D. S. Fanning, F. P. Miller and D. P. Wagner
  1978 Loess Deposits of the Eastern Shore of Maryland.
  Journal of the Soil Science Society of America 42:329333.
- Foss, Robert W.
  - 1984 Material Culture on the West Jersey Settlement Frontier. Paper presented at the 1984 Middle Atlantic Archaeological Conference, Rehoboth Beach, Delaware.
  - 1985 From the City to the Farm: Economic Relationships on a Rural Frontier Site in New Jersey. Paper presented at the Society for Historical Archaeology Annual Meeting, 1985, Boston, Massachusetts.

- Galasso, G. J.
  1983 Prehistoric Site Distributions in Central Kent County,
  Delaware. Undergraduate Honors Thesis in Anthropology.
  University of Delaware, Newark.
- Gardner, W. M.

  1974 The Flint Run Paleo-Indian Complex: Pattern and Process During the Paleo-Indian to Early Archaic. In The Flint Run Paleo-Indian Complex: A Preliminary Report, 1971-1973 Seasons. Occasional Publication No. 1, Catholic University Archaeology Laboratory, edited by W. M. Gardner, pp. 5-47. Washington, DC.
- 1977 Flint Run Paleo-Indian Complex and Its Implications for Eastern North American Pre-History. Annals of the New York Academy of Sciences 288:257-263.
- Comparison of Ridge and Valley, Blue Ridge, Piedmont, and Coastal Plain Archaic Period Site Distribution: An Idealized Transect (Preliminary Model). Paper presented at the 1978 Middle Atlantic Archaeological Conference, Rehoboth Beach, Delaware.
- Gardner, W. M. and R. M. Stewart

  1978
  A Cultural Resources Reconnaissance of Portions of the Middletown-Odessa Regional Sewer System, New Castle County, Delaware. Ms. on file, Island Field Museum, South Bowers, Delaware.
- Gardner, William
  1979 Euroamerican Settlement Patterns in the Shenandoah
  Valley. Paper presented at the Middle Atlantic
  Archaeological Conference, Rehoboth Beach, Delaware.
- Glassie, H.
  1968 Patterns in the Material Folk Culture of the Eastern
  United States. University of Pennsylvania Press,
  Philadelphia.
  - 1972 Eighteenth-Century Cultural Process in Delaware Valley Folk Building. Winterthur Portfolio 7:29-57.
- Griffith, D. R. and R. E. Artusy
  1976

  An Assessment of the Prehistoric Archaeological
  Resources of the Dover By-Pass Corridor: Frederica to
  Route 100 Kent County, Delaware. Delaware Department
  of Transportation Archaeology Series 7. Dover,
  Delaware.
- Green, Stanton W. and Stephen M. Perlman (editors)

  1985 The Archaeology of Frontiers and Boundaries. Academic
  Press, Orlando, Florida.

- Hancock, Harold
- 1932 A History of the Delaware Peach Industry. Ms. on file, Special Collections Room, Morris Library, University of Delaware, Newark.
- Agriculture in Delaware, 1789-1900. In Delaware: A History of the First State, vol. 1, edited by H. Clay Reed, pp. 373-389. Lewis Historical PublishingCo., New York.
- 1976 A History of Kent County, Delaware. Delaware Bicentennial Committee, Dover.
- Heite, Edward F. and Louise B. Heite
- 1981 Taxonomic Frameworks for Delaware Community Studies: The Physical Dimension. Ms. on file at UDCAR, Newark, Delaware.
- 1982 Proposal for a Survey and Planning Study of the Transportation Theme in Delaware History and Culture. Submitted to the Delaware Department of Transportation Project Planning. Ms. on file at the University of Delaware Center for Archaeological Research, Newark Delaware.
- 1985 Fork Branch/Dupont Station Community: Archaeological Investigations on Denny's Road, Dover, Kent County, Delaware. Delaware Department of Transportation Archaeology Series No. 37. Dover, Delaware.
- 1986 Historical Background Report of Cooper's Corner Near Dover, Kent County, Delaware. Delaware Department of Transportation Archaeology Series No. 38.
- Henretta, James A.
  1978 Families and Farms: Mentalite' in Pre-Industrial
  America. William and Mary Quarterly 35(1):3-32.
- Henry, Susan L.

  1981 Delaware Department of Transportation, Division of
  Highways, Working Draft Toward a Historic Research
  Design. Delaware Department of Transportation
  Archaeology Series 20. Dover, Delaware.
- Herman, B. L.

  1982 Delaware Vernacular: Folk Housing in Three Counties. In

  Perspectives in Vernacular Architecture, edited by

  Camille Wells, pp. 179-194. Vernacular Architecture

  Forum, Annapolis.
- Hoffecker, C. E.
  1973 Readings in Delaware History. University of Delaware
  Press, Newark.

- 1977 Delaware: A Bicentennial History. W. W. Norton, New York.
- Hofstadter, Richard A.
  1956 The Myth of the Happy Yeoman. American Heritage 7(2):
  43-53.
- Horvoth, Stephen M. Jr.

  1980 Ethnic Groups as Subjects of Archaeological Inquiry.

  In Forgotten Places and Things: Archaeological

  Perspectives on American History, edited by Albert E.

  Ward. Contributions to Anthropological Studies No. 3.

  Center for Anthropological Studies, Albuquerque,

  New Mexico.
- Hudson, John C.

  1969 A Location Theory for Rural Settlement. Annals of the
  Association of American Geographers 59(2):365-381.
- Issac, Rhys
  1982 The Transformation of Virginia. University of North
  Carolina, Chapel Hill.
- Jordan, R. R.
  1964 Columbia (Pleistocene) Sediments of Delaware. Delaware
  Geological Survey Bulletin No. 12, Newark.
- Kavanagh, M.

  1979 Archaeological Reconnaissance of Proposed Channel
  Improvements in the Upper Chester Watershed, Kent and
  Queen Annes Counties, Maryland. Maryland Geological
  Survey File Report No.147. Baltimore.
- King, T. C., P. P. Hickman and C. Berg
  1977 Anthropology in Historic Preservation. Academic Press,
  New York.
- Klein, Terry H., Patrick H. Garrow (editors)
  1984 Final Archaeological Investigations at the Wilmington
  Boulevard, Munroe to King Streets, Wilmington, New
  Castle County, DE. Delaware Department of
  Transportation Series 29. Dover, DE.
- Kraft, H. C. and R. A. Mounier

  The Archaic Period in New Jersey. In New Jersey's

  Archaeological Resources from the Paleo-Indian Period

  to the Present: A Review of Research Problems and

  Survey Priorities, edited by O. Chesler, pp. 52-102.

  New Jersey Department of Environmental Protection,

  Trenton.
- Kraft, J. C., E. A. Allen, D. F. Balknap, C. J. John, and E. M. Maurmeyer 1976 Delaware's Changing Shoreline. Technical Report, Delaware Coastal Zone Management Program No. 1, Newark.

- Laws of the State of Delaware

  1797 Laws of the State of Delaware. Vols. I and II. Samuel
  and John Adams, New Castle, Delaware.
- Lemon, James T.

  1967 Urbanization and the Development of Eighteenth Century
  Southeastern Pennsylvania and Adjacent Delaware.
  William and Mary Quarterly 24(4):501-542.
  - 1972 The Best Poor Man's Country. John Hopkins University, Baltimore.
- Loehr, Rodney C.
  1952 Self-Sufficiency on the Farm. Agricultural History
  26(2):37-41.
- Lothrop, Jonathan C., Jay F. Custer and Colleen DeSantis

  1986 Phase I and II Archaeological Investigations of the
  Route 896 Corridor, Route 4-West Chestnut Hill Road to
  Summit Bridge Approach, New CastleCounty, Delaware.
  Delaware Department of Transportation Archaeology
  SeriesNo. 47. Dover, Delaware.
- Marshall, S.

  1982 Aboriginal Settlement in New Jersey During the PaleoIndian Period ca. 10,000 6000 B.C. InNewJersey's
  Archaeological Resources from the Paleo-Indian Period
  to the Present: A Review of Research Problems and
  Survey Priorities, edited by O. Chesler, pp. 10-52.
  New Jersey Department of Environmental Protection,
  Trenton.
- Merrill, Michael
  1977 Cash is Good to Eat: Self-Sufficiency and Exchange in the Rural Economy of the United States. Radical History Review 3(4):42-71.
- Miller, Henry M.

  1980 Research Designs in Historical Archaeology. Paper
  presented at the 10th Annual Middle Atlantic
  Archaeological Conference.
- Miller, J. Jefferson and Lyle M. Stone
  1970 Bighteenth Century Ceramics from Fort Michilimackinac.
  Smithsonian Studies in History and Technology No. 4.
  Smithsonian Institute, Washington, D. C.
- Mitchell, Robert D.

  1978
  The Formation of Early American Culture Regions: An Interpretation. In European Settlement and Development in North America: Essays on Geographical Change in Honor and Memory of Andrew Hill Clark, edited by James R. Gibson, pp. 66-90. University of Toronto, Toronto.

Munroe, John A.
1978 Colonial Delaware. KTO Press, Millwood, New York.

1984 History of Delaware. 2nd ed. University of Delaware, Newark.

National Park Service
1983 Recovery of Scientific, Prehistoric, Historic, and
Archaeological Data: Methods, Standards, and Reporting
Requirements. U.S. Government Printing Office,
Washington, DC.

O'Conner, James, Kevin W. Cunningham, Ellis C. Coleman and Thomas W. Brockenbrough, Jr.

Archaeological, Historical, and Architectural Evaluation of the Cantrell Warehouse/Enterprise Steam Mill, Stein Highway, Seaford, Sussex County, Delaware. Delaware Department of Transportation Archaeology Series No. 33. Dover, Delaware.

Otto, John Solomon

1977 Artifacts and Status Differences - A Comparisons of
Ceramics from Planter, Overseer, and Slave Sites on an
Antebellum Plantation. In Research Strategies in
Historical Archaeology, edited by Stanly South, pp. 91-

Academic, New York.

118.

Pennsylvania Archives
1891 Land Warrants for New Castle, Kent and Sussex Counties,
ca. 1735. Pennsylvania Archives 7(1891):193-204.

Pogue, Dennis J.

1986 A Case Study in Late 17th Century Plantation Layout and
Evolution: King's Reach. Paper presented at the 1986
Middle Atlantic Archaeological Conference, Rehoboth
Beach, Delaware.

Raab, L. Mark and Timothy C. Klinger
1977 A Critical Appraisal of 'Significance' in Contract
Archaeology. American Antiquity 42(4):629-634.

Rappleye, L. and W. M. Gardner
1980 A Cultural Resources and Impact Area Assessment, Bombay
Hook National Wildlife Refuge, Kent County, Delaware.
Ms on file, Island Field Museum, South Bowers,
Delaware.

Rasmussen, W. C.

1958 Geology and Hydrology of the "Bays" and Basins of
Delaware. Ph.D. dissertation, Bryn Mawr College.
University Microfilms, Ann Arbor.

- Rodeffer, Stephanie H.

  1984 Poverty in the Archaeological Record: The Historic Mitigation Program for the Tombigbee River Multi-Resource District, Alabama and Mississippi. Paper presented at the Society for American Archaeology, 1984 Conference, Ugene, Oregon.
- Schlereth, Thomas J. (editor)
  1985 Material Culture: A Research Guide. University Press
  of Kansas, Lawrence, Kansas.
- Schuyler, Robert (editor)
  1980 Archaeological Perspectives on Ethnicity in America.
  Baywood, Farmingdale, New York.
- South, Stanly A.

  1972 Evolution and Horizon as Revealed in Ceramic Analysis in Historical Archaeology. In The Conference on Historic Site Archaeology Papers, vol. 6. University of South Carolina, Columbia, South Carolina.
  - 1977 Research Strategies in Historical Archaeology. Academic Press, New York.
- Scharf, J. Thomas
  1888 History of Delaware, 1609-1888. Vols. I and II.
  L. J. Richards and Co, Philadelphia.
- Shaffer M. and J.F. Custer

  1986

  Data Recovery Excavation at the Whitten Road Site, 7NCD-100, New Castle County, Delaware. Delaware Department
  of Transportation Archaeology Series (in press).

  Dover, Delaware.
- Smith, Barbara
  1985 After the Revolution, The Smithsonian History of
  Rveryday Life in the Eighteenth Century. Pantheon
  Books/Random House, New York.
- Stewart, R. M., C. Hummer, and J. F. Custer

  1986 Late Woodland Cultures of the Upper Delmarva Peninsula
  and Lower and Middle Delaware River Valley. In Late
  Woodland Cultures of the Middle Atlantic Region, edited
  by J. F. Custer. University of Delaware Press, Newark.
- Tate, Thad W. and David L. Ammerman, (editors)

  1979 The Chesapeake in the Seventeenth Century: Essays on
  Anglo-American Society and Politics. W. W. Norton and
  Co., New York.
- Taylor, George R.

  1951 The Transportation Revolution, 1815-1860. Economic History of America Series No.IV. M. E. Sharpe, Inc., White Plains, New York.

- Third United States Census
- n.d. Third United States Census (1810). Book 1. Luther M. Cornwall and the American Antiquarian Society, New York.
- Thomas, R. A.
- 1976 A Re-evaluation of the St. Jones River Site.

  Archaeology of Eastern North America 4:89-110.
- Routes 4, 7, and 273: An Archaeological Survey. A Location and Identification Survey of Delaware DOT Projects along Routes 4, 7, and 273, New Castle County, Delaware. Mid-Atlantic Archaeological Research, Inc. (MAAR). 2 volumes. Submitted to the Delaware Department of Transportation, Dover, Delaware.
- Wacker, Peter

Delaware.

- 1975 Land and People: A Cultural Geography of Pre-industrial New Jersey: Origins and Settlement Patterns. Rutgers University Press, New Brunswick, New Jersey.
- Ward, Mary Sam
  1968 Inns and Taverns of Delaware, 1800-1850. Unpublished
  Master's thesis, Department of American Studies,
  University of Delaware.
- Ward, H. Henry and David C. Bachman

  1986 Testing the Xerothermic Model on the Delmarva
  Peninsula: Buried Sites in Aeolian Contexts. Paper
  presented at the 1986 Middle Atlantic Archaeological
  Conference, Rehoboth Beach, Delaware.
- Wells, Camille, (editor)
  1982 Perspectives in Vernacular Architecture. Vernacular
  Architecture Forum, Annapolis.
- Weslager, C. A.
  1961 Dutch Explorers, Traders, and Settlers in the Delaware
  River Valley, 1609-1664. University of Pennsylvania
  Press, Philadelphia.
  - 1967 The English on the Delaware: 1610-1682. Rutgers University Press, New Brunswick, New Jersey.
- Wesler, Kit
- 1982 Towards a Synthetic Approach to the Chesapeake Tidewater: Historic Site Patterning in Temporal Perspective. Unpublished Ph.D. dissertation, University

of North Carolina, Chapel Hill.

- Wilkins, Elwood S., Jr. and Richard C. Quick

  1976
  The House on the Kirby Tract, Better Known as Carson's, or the Buck Tavern, ca. 1728-1820, and 1821-1963.

  Monograph no. 1. Archaeological Society of Delaware, Wilmington.
- Wise, Cara L.

  1978 Early Historic Settlement in Delaware. Paper presented at the Eighth Annual Middle Atlantic Archaeological Conference, Rehoboth Beach, Delaware.
  - 1979a Early Historic Settlement in Delaware Revisited: The St. Jones Neck Archaeological Survey. Paper presented at the Ninth Annual Middle Atlantic Archaeological Conference, Rehoboth Beach, Delaware.
  - 1979b From Creek to Road: Changing Settlement Patterns in Colonial Delaware. Ms. on file at UDCAR, Newark, Delaware.
  - 1980 Changing Colonial Settlement Patterns in Delaware's Coastal Plain. Ms. on file at UDCAR, Newark, Delaware.
  - 1983 Development of a Cultural Resources Management Plan for Lums Pond State Park. Delaware Division of Parks and Recreation, Dover.
- Witthoft, J.

  1984 Comparison of Delaware and Susquehannock Settlement
  Patterns. In The Lenape Indians: A Symposium, edited
  by H. C. Kraft, pp. 33-36. Seton Hall University
  Museum, South Orange, New Jersey.

#### MAP SOURCES CONSULTED

Map of New Castle County, Delaware from Original Surveys. Samuel Rea and Jacob Price. Smith and Wister, Philadelphia, 1849.

Map of the State of Delaware, from Original Surveys. Jacob Price and Samuel Rea. Smith, Philadelphia, 1850.

Map of Kent County, Delaware from Actual Surveys. J.H. French and J.L. Skinner. Byles, Philadelphia, 1859.

Atlas of the State of Delaware. Pomeroy and Beers, Philadelphia, 1868.

Geologic Map of Delaware, from Delaware Geological Survey, 1976.

### PUBLIC HANDOUTS

### ROUTE 13 CORRIDOR CULTURAL RESOURCES PLANNING

Cultural Resource Planning

Archaeology from 900 Kilometers up in the Sky

Federal Highway Administration's 1984 Biennial Award



## STATE OF DELAWARE DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

P.O. Box 778

DOVER DELAWARE 19903

### PROPOSED ROUTE 13 RELIEF CORRIDOR CULTURAL RESOURCES PLANNING







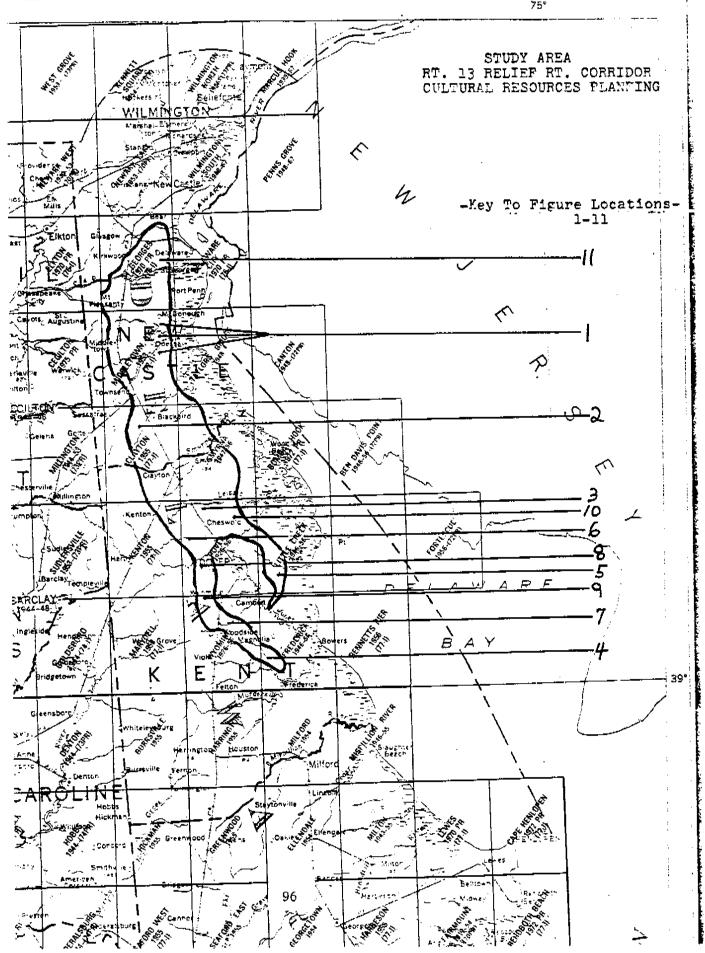


A historic and prehistoric cultural resource planning survey is being conducted by the Delaware Department of Transportation, Division of Highways, and the Federal Highway Administration in conjunction with the University of Delaware, Center for Archaeological Research. The planning is necessitated by the proposed U.S. Route 13 corridor in New Castle and Kent Counties.

The Route 13 corridor study area (approximately 40 miles N-S by 8 miles E-W) traverses some of the oldest and most important prehistoric and historic settlement areas in the State of Delaware. The earliest known prehistoric peoples lived during the Paleo-Indian Period, from about 12,000 B.C. - 6500 B.C. This period overlapped and immediately followed the last great glaciation of North America. These peoples probably lived a nomadic existence, collecting wild vegetal foods and hunting now extinct large game animals such as bison, mastadons, sloths, etc. The project area contains no known sites from this period, but they have been found nearby and may be located during the survey.

The Archaic Period (6500 B.C. - 3000 B.C.) saw the establishment of oak and hemlock forests over the landscape, with the peoples adapting to present day plant and animal forms. The adaptation was one of a more generalized hunting and gathering pattern in which plant food resources would have played an increasingly important role. The settlement pattern consisted of large base camps and outlying hunting sites, reflective of a social organization characterized by the seasonal waxing and waning of band groups. Archaic Period sites in the project area include the Indian Mound site (7NC-E-2) in northern New Castle County and (7K-A-10), a procurement site near Smyrna.





The Woodland I Period (3000 B.C. - A.D. 1000) saw a flourishing of tool types and a large increase in the number of known sites within the project area. In addition, large sedentary base camps were established, such as the Robbins Farm, Barker's Landing, and Coverdale sites in southern Kent County, and the Hell Island site near Odessa. The intensive harvesting of wild plant foods that may have approached the efficiency of agriculture, and the introduction of broadbladed, knife-like chipped stone tools were important developments during this period. Also seen was the addition of stone, and later ceramic, containers, which allowed for the efficient cooking and storing of foods. Major trade networks are evident from the presence of exotic raw materials utilized for the manufacture of utilitarian and ceremonial objects.

The Woodland II Period (A.D. 1000 -A.D. 1650) contains many similar resource procurement methods and the large base camp settlement system of the Woodland I Period. However, there was an increasing reliance on plant foods and coastal resources, such as shellfish. Social organization changes were evidenced by a collapse of the trade and exchange networks and the end of elaborate cemeteries. An important site from this period is the Hughes-Willis site near Little Creek, a macro-band, summer-fall nut processing camp.

The Contact Period (A.D. 1650 - A.D. 1750) is that period when European settlers entered the area and first made contact with the native peoples. These sites are characterized by a mixing of Indian and European lifeways and artifacts and have much to tell about the acculturation process experienced by the Indians. Unfortunately, no documented Contact Period sites have ever been found in Delaware, although they have been found in Pennsylvania and other surrounding states.

The Historic Period, although only about 350 years in length, is equally as complex. The first permanent settlement in Delaware was the Dutch settlement of Zwaanendael, established as a whaling colony near present-day Lewes in 1629. However, relatively little settlement took place in the project area for the remainder of the seventeenth century. The land was sparsely settled, with scattered subsistence farms and logging, milling, and fur trading operations along the principal water courses, which were the major transportation routes.

The Delmarva Peninsula has long been primarily an agricultural region and its historic development is closely tied to farming practices. When William Penn assumed proprietary rights over the "three colonies on the Delaware" in 1682, settlement was strongly encouraged through the granting of land patents. Most prime agricultural land along the principal transportation routes (navigable streams and a few early cart roads) were occupied by the middle ofthe 18th century. Also at this time, many marshes, particularly along Drawyer's Creek, Appoquinimink Creek, and the Leipsic River within the project area, were drained to provide more farmland.

Most early farm production was of a "subsistence" nature, where products were grown and consumed at the same location. However, toward the end of the 18th century, wheat and timber came to be grown as "cash" crops.

The first three-quarters of the 19th century saw tremendous expansion and development on the Delmarva Peninsula. The increasing demand of large, domestic markets for the agricultural products of the hinterland and the stablishment of reliable transportation facilities, including the construction of turnpikes, cartroads, canal and railroad lines, spurred the development and productivity of the "spine" of the Peninsula. The pattern of dispersed farmsteads continued, but extensive local road systems connected farmsteads to transport facilities and towns. Wheat and peaches were the market-oriented crops and many of the wealthy peach growers mansions still stand in the project area, particularly around Middletown, Odessa, and Townsend.

The late 19th century was characterized by a solidification of previous land use patterns, with small but steady growth in the agrarian towns accompanied by the introduction of light manufacturing, such as tanneries and carriage makers. Also notable within the project area was the growth of numerous black communities. Major technological developments, including advances in agricultural machinery, home construction techniques, and the introduction of gas, electricity, central heat, and indoor plumbing, profoundly affected the lifeways of the time.

The 20th century has seen the shift away from wheat and peaches to the production of soybeans and feed corn to support the lower Delmarva chicken industry. The small farming communities lost their economic importance as storage and redistribution facilities, busineses, and service providers became concentrated in the major population centers outside the project area. New homes were constructed in once predominantly rural areas and new commercial-industrial-service employers supplied jobs to the growing non-agricultural suburban populations.

The systematic survey of the study area is designed to gather information on patterns of prehistoric and historic occupation. The study area encompasses diverse environmental zones and should yield significant new data on a variety of past Delaware lifeways through time as well as refining the concepts of prehistoric and historic cultural development outlined above.

If you request any further information or particulars concerning this cultural resource project, please contact Kevin Cunningham, DelDOT Archeologist at 736-3243 or Jay Custer, Assistant Professor of Anthropology, University of Delaware at 451-2821.



# STATE OF DÉLAWARE DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS P.O. BOX 778

OFFICE OF THE DIRECTOR

PUBLIC INFORMATION HANDOUT

TELEPHONE: 302-736-3243

### U.S. RT. 13 CORRIDOR STUDY 1984-1985

### ARCHAEOLOGY FROM 900 KILOMETERS UP IN THE SKY

Most people associate archaeology with excavations below the earth's surface, but new research by the Delaware Department of Transportation and the University of Delaware Center for Archaeological Research has found ways to use satellites circling the earth at an altitude of more than 900 kilometers to look for prehistoric archaeological sites. Archaeologists have used aerial photographs to look for ruins, mounds, and other signs of prehistoric archaeological sites since the 1920s when Charles Lindberg photographed many Indians of the Southwestern United States. However, use of satellite imagery is a new application in archaeology.

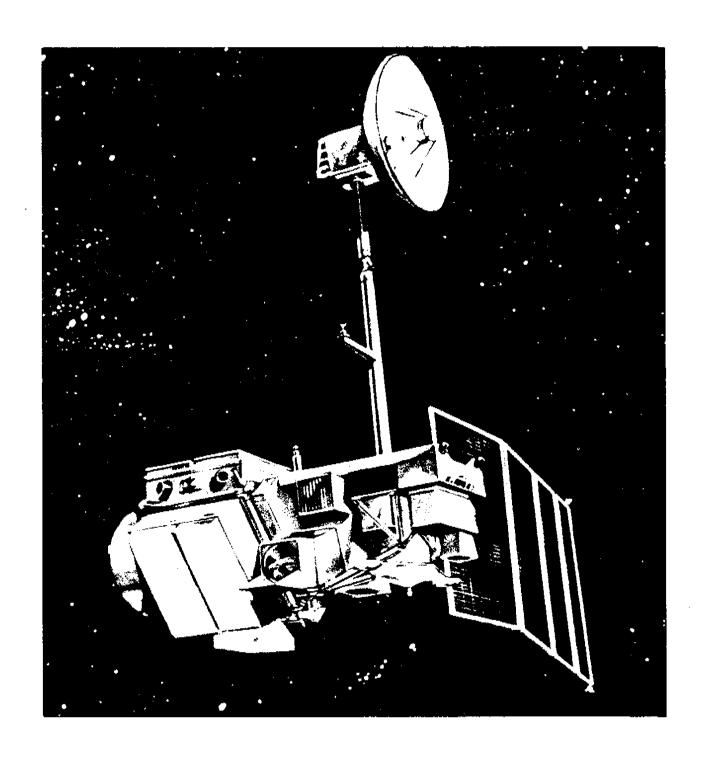
The Delaware Department of Transportation's interest in applying satellite technology to archaeology began when it was faced with the planning and development of a large highway corridor which traversed an area known to have a high potential for prehistoric archaeological sites. In order to minimize the impact of the highway on prehistoric archaeological sites and to minimize excavation and mitigation costs, it was necessary to develop accurate predictions of archaeological sites. These predictions would then be used to guide highway design studies.



Over the past few years, the University of Delaware Center for Archaeological Research had been studying applications of LANDSAT satellite data to archaeological survey techniques. The LANDSAT satellite circles the earth at an altitude of 900 kilometers and records various types of energy reflected from the earth's surface. The data recorded by LANDSAT can then be used to map out various types of environments. In Delaware, LANDSAT data have been used to map out various types of marshes, woodlands, and soil types.

LANDSAT data can then be applied to archaeology by correlating the environments mapped by LANDSAT with known archaeological site locations. After patterns of association between site locations and environments mapped by LANDSAT are noted, other similar environmental zones with high potential for archaeological sites can be noted. Research at the University of Delaware Center for Archaeological Research developed the computer programs needed to analyze the LANDSAT and archaeological data and to map out areas with high probabilities of archaeological site locations.

These techniques were then applied to the 40 mile long and 7 mile wide ROUTE 13 corridor and a series of specific high and medium probability zones were plotted on USGS 7.5' quadrangle maps. Field tests of the predictions showed a 90% accuracy rate. These maps are now being used to guide design alternatives of the highway.





U.S. Department of Transportation

Federal Highway Administration

### 1984 Biennial Awards

### **Excellence In Highway Design**

Category VI Historic Preservation and **Cultural Enhancement** (Cultural, Historical, Natural, and Archeological Sites)

- Specific Criteria: Preserving historical or archeological sites
  - Restoration
  - · Enhancement efforts

### Judged Superior

### **Delaware Department of Transportation**

Following preliminary work in actual examination of land forms in the area of Route 13, LANDSAT satellite data were used effectively to predict locations of potential archeological resources.

### **Entry Form** 1984 Biennial Awards

Tape this page or copy to back of each photograph and send to:

U.S. Department of Transportation Federal Highway Administration Division Office (see back of this form)

### Excellence In Highway Design

Entries must be postmarked by May 31, 1984.

1. PLEASE TYPS. Describe the project in a problem-solution format or present the most significant achievement of the project. Particularly address one or more of the general criteria. (150-200 typewritten words, single spaced, clearly expressed in NONTECHNICAL language and easily understood by any lay person).

The University of Delaware Center for Archaeological Research, under contract with the Delaware Department of Transportation, Division of Highways, Location and Environmental Studies Office, developed methods for making quantified predictions of likely locations for prehistoric archaeological sites within Delaware's proposed Route 13 Relief Route Corridor. ors ė/ **-1** riec al 0 ite ues

Predictions were developed	by using cynontic analysis	s of LANDSAT satellite data. Location
known to contain archaeole	orical sites were analyses	to see if special environmental factor
distance to curface water	ngical sites were analyzed (	ed and poorly-drained soils, presence
absence of marchas are )	rould be several and with air	te locations. Correlations were deve
oped using a continuing of	route be correlated with si	te locations. Correlations were deve
oped using a statistics pa	ickage called logistical reg	gression. Similar analyses were carr
monoid water INVEST	) contain archaeological sit	tes as well. Environmental data were
mapped dsing LAMDSAI sate	lite data processed with at	n ERDAS interactive image analysis
computer system. The ERDs	is computer was then used to	o analyze areas with no archaeologica
survey data. Application	of the logistical regression	on to unknown areas using the ERDAS/
LAMPSAT environmental data	loase compared the environment	mental settings of unsurveyed areas t
those of surveyed areas an	id generated an estimate of	the probability of finding a prehis-
toric site in the unsurvey	ed area based on the simila	arity of the environments to known si
areas. Tests or prediction	ns showed a 92% accuracy.	Areas with high site probability val
selection purposes	ilineate "sensitive" areas i	for assistance with highway alignment
selection purposes. VI.	<u> Historic Preservation and (</u>	Cultural Enhancement
3. Number of Photographs in This Entry _	Three	
		nmounted, 11 ×14-inches, color, in dualicates
Photo #1 I.D. No. 25 1	Photo #2 I.D. No	Photo #3 I.D. No. DE 3
4. Name of Person Submitting This Entr	y and Knowledgeable Regarding Questi-	ons Concerning Entry
	DelDOT Archaeologist	
Address <u>Department of Trans</u>	portation. Division of High	ways, P.O. Box 778
Dover, Delaware	7in 19903	70: No. 302-736-3243
		Tel. No. 302-736-3243
<ol><li>Name of Organization to Receive Awar</li></ol>	d <u>Delaware Department of I</u>	Transportation, Division of Highways
Address P.O. Box 778 Dover,	Delaware	
	Zip 19903	302-736-4642
	Zip	Tel. No. DOZMI JOGGE
Name of Senior Representative to Noti-	<sub>fy</sub> <u>Joseph T. Wutka, Jr., I</u>	Location & Environmental Engineer
		ion of Highways, P. O. Box 778
Dover, Delaware		
	Zip	Tel. No. 302-736-4642
S. Project Owner <u>Delaware Depar</u>	tment of Transportation, Di	vision of Highways
Address P.O. Box 778,	Dover, Delaware	
		· · · · · · · · · · · · · · · · · · ·
	Zip <u>19903</u>	Tel. No. 302-736-4642
7. Agencies of Firms Responsible for De		(Area Cade)
The Target and Disease	sign, in Other Main Owner	cal Research, University of Delaware
_		cal Acsearch, University of Octavate
Address Orchard Street, New	ark, Delaware	
	<b>Z</b> ip19716	Tel. No. 302-451-2821
	· ·	[Ares Code)
<ol> <li>Project Location Information Route No.</li> </ol>	Date Project	Completed Jaquary 1984



### PUBLISHED ROUTE 13 CULTURAL RESOURCES REPORTS

For a copy of the following reports:

Delaware Department of Transportation Division of Highways Location and Environmental Studies Office P.O. Box 778 Dover, DE 19903 (302) 736-4644

- Custer, Jay F., Patricia Jehle, Thomas Klatka and Timothy Eveleigh
  - A Cultural Resources Planning Study of the Proposed Rt.

    13 Relief Corridor, New Castle and Kent Counties, DE.
    Delaware Department of Transportation Archaeology
    Series 30. Dover, DE.
- Custer, Jay F. and Kevin W. Cunningham (Editors), Wade P. Catts
  1986 Prehistoric and Historic Archaeological Resources and
  the Historic Standing Structures of the Proposed U.S.
  Route 13 Corridor: An Overview Prepared for the Draft
  Environmental Impact Statement. Delaware Department of
  Transportation Archaeology Series 40. Dover, DE.
- Custer, Jay F. and David C. Bachman

  1986
  An Archaeological Planning Survey of Selected Portions
  of the Proposed Route 13 Corridor, New Castle County,
  DE. Delaware Department of Transportation Archaeology
  Series 44. Dover, DE.
- Custer, Jay F., David C. Bachman and David Grettler
  1986 An Archaeological Planning Survey of Selected Portions
  of the Proposed Route 13 Corridor, Kent County, DE.
  Delaware Department of Transportation Archaeology
  Series 45. Dover, DE.
- Custer, Jay F., David C. Bachman and David J. Grettler
  1987 Phase I and II Archaeological Research Plan, U.S. Route
  13 Relief Route, Kent and New Castle Counties, DE.
  Delaware Department of Transportation Archaeology
  Series 54. Dover, DE.
- Benenson, Carol A. and Mark A. Bower
  1987 Architectural Investigations of the U.S. Route 13
  Corridor, New Castle and Kent Counties, DE. Delaware
  Department of Transportation Archaeology Series 57.
  Dover DE. (IN PRESS).